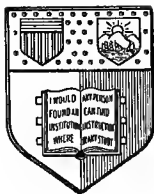


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SEPTEMBER, 1908.

| | | |
|----|----|--|
| 1 | Tu | |
| 2 | W | |
| 3 | Th | |
| 4 | F | |
| 5 | S. | |
| 6 | S | |
| 7 | M | |
| 8 | Tu | |
| 9 | W | |
| 10 | Th | |
| 11 | F | Preliminary Examination in Science and Competition for Bursaries begin. |
| 12 | S | |
| 13 | S | |
| 14 | M | |
| 15 | Tu | |
| 16 | W | { Names of Candidates for B.Sc. Examinations in Agriculture to be given in to Assistant Clerk, University Matriculation Office. |
| 17 | Th | |
| 18 | F | |
| 19 | S | { Names of Candidates for College Diploma (October) Examination to be given in to the Principal. |
| 20 | S | |
| 21 | M | Governors' Meeting. |
| 22 | Tu | |
| 23 | W | |
| 24 | Th | |
| 25 | F | |
| 26 | S | |
| 27 | S | |
| 28 | M | { Examination for N.D.D. begins. Degree Examinations in Mathematics. |
| 29 | Tu | |
| 30 | W | |

OCTOBER, 1908.

| | | |
|----|----|--|
| 1 | Th | |
| 2 | F | Degree Examinations in Engineering Field Work and Economic Science. |
| 3 | S | { Degree Examinations in Natural Philosophy, Agriculture, and Agricultural Entomology. |
| 4 | S | |
| 5 | M | Degree Examinations in Botany, Engineering, and Chemistry. |
| 6 | Tu | Degree Examinations in Zoology, Geology, and Veterinary Science. |
| 7 | W | |
| 8 | Th | |
| 9 | F | |
| 10 | S | |
| 11 | S | |
| 12 | M | |
| 13 | Tu | Students enrolled from 7 to 9 p.m. |
| 14 | W | Students enrolled from 10 a.m. to 3 p.m. Introductory Lecture at 8 p.m. |
| 15 | Th | { Classes begin. |
| 16 | F | |
| 17 | S | |
| 18 | S | |
| 19 | M | |
| 20 | Tu | |
| 21 | W | |
| 22 | Th | University Matriculation ends. |
| 23 | F | |
| 24 | S | |
| 25 | S | |
| 26 | M | |
| 27 | Tu | |
| 28 | W | |
| 29 | Th | |
| 30 | F | |
| 31 | S | |

NOVEMBER, 1908.

| | | |
|----|----|--|
| 1 | S | |
| 2 | M | |
| 3 | Tu | |
| 4 | W | |
| 5 | Th | |
| 6 | F | |
| 7 | S | |
| 8 | S | |
| 9 | M | |
| 10 | Tu | |
| 11 | W | |
| 12 | Th | |
| 13 | F | |
| 14 | S | |
| 15 | S | |
| 16 | M | |
| 17 | Tu | |
| 18 | W | |
| 19 | Th | |
| 20 | F | |
| 21 | S | |
| 22 | S | |
| 23 | M | |
| 24 | Tu | |
| 25 | W | |
| 26 | Th | |
| 27 | F | |
| 28 | S | |
| 29 | S | |
| 30 | M | |

DECEMBER, 1908.

| | | |
|----|----|----------------------------|
| 1 | Tu | |
| 2 | W | |
| 3 | Th | |
| 4 | F | |
| 5 | S | |
| 6 | S | |
| 7 | M | |
| 8 | Tu | |
| 9 | W | |
| 10 | Th | |
| 11 | F | |
| 12 | S | |
| 13 | S | |
| 14 | M | |
| 15 | Tu | |
| 16 | W | |
| 17 | Th | |
| 18 | F | |
| 19 | S | Christmas Vacation begins. |
| 20 | S | |
| 21 | M | |
| 22 | Tu | |
| 23 | W | |
| 24 | Th | |
| 25 | F | |
| 26 | S | |
| 27 | S | |
| 28 | M | |
| 29 | Tu | |
| 30 | W | |
| 31 | Th | |

JANUARY, 1909.

| | | |
|----|----|--|
| 1 | F | |
| 2 | S | |
| 3 | S | |
| 4 | M | |
| 5 | Tu | Classes resume. |
| 6 | W | |
| 7 | Th | |
| 8 | F | |
| 9 | S | |
| 10 | S | |
| 11 | M | { Special Month's Course for Farmers begins. { Special Month's Course in Dairying begins at the Dairy School. |
| 12 | Tu | |
| 13 | W | |
| 14 | Th | |
| 15 | F | |
| 16 | S | |
| 17 | S | |
| 18 | M | |
| 19 | Tu | |
| 20 | W | |
| 21 | Th | |
| 22 | F | |
| 23 | S | |
| 24 | S | |
| 25 | M | Governors' Meeting. |
| 26 | Tu | |
| 27 | W | |
| 28 | Th | |
| 29 | F | |
| 30 | S | |
| 31 | S | |

FEBRUARY, 1909.

| | | |
|----|----|------------------------------|
| 1 | M | |
| 2 | Tu | |
| 3 | W | |
| 4 | Th | |
| 5 | F | |
| 6 | S | Special Month's Courses end. |
| 7 | S | |
| 8 | M | |
| 9 | Tu | |
| 10 | W | |
| 11 | Th | |
| 12 | F | |
| 13 | S | |
| 14 | S | |
| 15 | M | |
| 16 | Tu | |
| 17 | W | |
| 18 | Tb | |
| 19 | F | |
| 20 | S | |
| 21 | S | |
| 22 | M | |
| 23 | Tu | |
| 24 | W | |
| 25 | Th | |
| 26 | F | |
| 27 | S | |
| 28 | S | |

MARCH, 1909.

| | | |
|----|----|--|
| 1 | M | { Entries for Examination for National Diploma in Agriculture to be made this month. |
| 2 | Tu | |
| 3 | W | |
| 4 | Th | [given in. |
| 5 | F | { Names of Candidates for University Preliminary Examinations to be |
| 6 | S | { Names of Candidates for College Diploma Examinations to be given in. |
| 7 | S | |
| 8 | M | Names of Candidates for B.Sc. Degree Examinations to be given in. |
| 9 | Tu | |
| 10 | W | |
| 11 | Tb | |
| 12 | F | |
| 13 | S | |
| 14 | S | |
| 15 | M | |
| 16 | Tu | |
| 17 | W | |
| 18 | Th | |
| 19 | F | { Winter Session ends. |
| 20 | S | { Degree Examination in Mathematics. |
| 21 | S | |
| 22 | M | { Degree Examinations in Chemistry and Zoology. |
| 23 | Tu | { Examinations for College Associateship and Diploma begin. |
| 24 | W | { Dairy School opens. Degree Examination in Botany. |
| 25 | Th | { Degree Examination in Engineering Field Work. |
| 26 | F | { Degree Examinations in Natural Philosophy, Agriculture, and Agricultural Entomology. |
| 27 | S | { University Preliminary Examination begins. |
| 28 | S | { Degree Examinations in Engineering and Veterinary Science. |
| 29 | M | { Degree Examination in Geology. |
| 30 | Tu | { Junior Course in Dairying commences. |
| 31 | W | { Degree Examinations in Botany and Chemistry. |
| | | { Degree Examination in Zoology. |
| | | { Degree Examination in Economic Science. |

APRIL, 1909.

| | | |
|----|----|---|
| 1 | Th | |
| 2 | F | |
| 3 | S | |
| 4 | S | |
| 5 | M | First Ten Weeks' Course in Poultry-keeping commences. |
| 6 | Tu | |
| 7 | W | |
| 8 | Th | |
| 9 | F | |
| 10 | S | |
| 11 | S | |
| 12 | M | University Graduation. |
| 13 | Tu | |
| 14 | W | University Summer Session begins. |
| 15 | Th | |
| 16 | F | |
| 17 | S | |
| 18 | S | |
| 19 | M | |
| 20 | Tu | |
| 21 | W | |
| 22 | Th | |
| 23 | F | |
| 24 | S | |
| 25 | S | |
| 26 | M | Course for Butter-making Certificate commences. |
| 27 | Tu | |
| 28 | W | |
| 29 | Th | |
| 30 | F | |

MAY, 1909.

| | | |
|----|----|--------------------------------------|
| 1 | S | |
| 2 | S | |
| 3 | M | |
| 4 | Tu | |
| 5 | W | |
| 6 | Th | |
| 7 | F | |
| 8 | S | |
| 9 | S | |
| 10 | M | |
| 11 | Tu | |
| 12 | W | |
| 13 | Th | |
| 14 | F | |
| 15 | S | |
| 16 | S | |
| 17 | M | |
| 18 | Tu | |
| 19 | W | |
| 20 | Th | |
| 21 | F | |
| 22 | S | |
| 23 | S | |
| 24 | M | |
| 25 | Tu | |
| 26 | W | |
| 27 | Th | |
| 28 | F | |
| 29 | S | |
| 30 | S | |
| 31 | M | Senior Course in Dairying commences. |
| | | |

JUNE, 1909.

| | | |
|----|----|--|
| 1 | Tu | |
| 2 | W | |
| 3 | Th | |
| 4 | F | |
| 5 | S | Opening Demonstration at Experiment Station, Kilmarnock. |
| 6 | S | |
| 7 | M | |
| 8 | Tu | |
| 9 | W | |
| 10 | Th | |
| 11 | F | |
| 12 | S | |
| 13 | S | |
| 14 | M | |
| 15 | Tu | |
| 16 | W | |
| 17 | Th | |
| 18 | F | |
| 19 | S | |
| 20 | S | |
| 21 | M | |
| 22 | Tu | |
| 23 | W | |
| 24 | Th | |
| 25 | F | |
| 26 | S | |
| 27 | S | |
| 28 | M | Governors' Meeting. |
| 29 | Tu | |
| 30 | W | |

JULY, 1909.

| | | |
|----|----|--|
| 1 | Th | |
| 2 | F | |
| 3 | S | Monthly Demonstration at Experiment Station. |
| 4 | S | |
| 5 | M | Second Ten Weeks' Course in Poultry-keeping commences. |
| 6 | Tu | |
| 7 | W | |
| 8 | Th | |
| 9 | F | |
| 10 | S | |
| 11 | S | |
| 12 | M | |
| 13 | Tu | |
| 14 | W | |
| 15 | Th | |
| 16 | F | |
| 17 | S | |
| 18 | S | |
| 19 | M | |
| 20 | Tu | |
| 21 | W | |
| 22 | Th | |
| 23 | F | |
| 24 | S | |
| 25 | S | |
| 26 | M | |
| 27 | Tu | |
| 28 | W | |
| 29 | Th | |
| 30 | F | |
| 31 | S | |

AUGUST, 1909.

| | | |
|----|----|---|
| 1 | S | { Entries for Examination for National Diploma in Dairying to be made this month. |
| 2 | M | |
| 3 | Tu | |
| 4 | W | |
| 5 | Th | Monthly Demonstration at Experiment Station. |
| 6 | F | |
| 7 | S | |
| 8 | S | |
| 9 | M | Applications for Bursaries to be lodged with Principal Wright. |
| 10 | Tu | |
| 11 | W | |
| 12 | Th | |
| 13 | F | |
| 14 | S | |
| 15 | S | |
| 16 | M | |
| 17 | Tu | |
| 18 | W | |
| 19 | Th | |
| 20 | F | |
| 21 | S | |
| 22 | S | |
| 23 | M | |
| 24 | Tu | |
| 25 | W | |
| 26 | Th | |
| 27 | F | |
| 28 | S | |
| 29 | S | |
| 30 | M | |
| 31 | Tu | |

SEPTEMBER, 1909.

| | | |
|----|----|--|
| 1 | W | Closing Demonstration at Experiment Station. |
| 2 | Th | |
| 3 | F | |
| 4 | S | |
| 5 | S | |
| 6 | M | |
| 7 | Tu | |
| 8 | W | |
| 9 | Th | |
| 10 | F | |
| 11 | S | |
| 12 | S | |
| 13 | M | |
| 14 | Tu | |
| 15 | W | |
| 16 | Th | |
| 17 | F | |
| 18 | S | |
| 19 | S | |
| 20 | M | |
| 21 | Tu | Dairy School closes. |
| 22 | W | |
| 23 | Th | |
| 24 | F | |
| 25 | S | |
| 26 | S | |
| 27 | M | |
| 28 | Tu | |
| 29 | W | |
| 30 | Th | |

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE.

THE COLLEGE was founded in the year 1899 under the following scheme, formulated by the Scotch Education Department:—

SCHEME FOR AGRICULTURAL COLLEGE FOR THE WEST OF SCOTLAND.

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2. This College to be under the management of a body constituted as follows:—

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- (b) There shall be Five Representatives of the Glasgow and West of Scotland Technical College, while Three Representatives shall be elected for life by the Governors of the present Kilmarnock Dairy School, the entire management of which shall thereupon be transferred to the new Governing Body.
- (c) Two Representatives of Glasgow University.
- (d) Two Representatives of the Highland and Agricultural Society.
- (e) Four additional Members to be elected by the foregoing.

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4. The new Governing Body shall be bound to provide, both at Glasgow and Kilmarnock, facilities for instruction in Agriculture at least equal to those presently afforded in each of these places, except that they may, at their option, transfer one of the Short Farmers' Courses presently conducted in Glasgow to Kilmarnock, and may further discontinue any form of instruction at either of these centres on its being shown to the satisfaction of the Scotch Education Department that there no longer exists a reasonable demand for that form of instruction at that centre.

5. Instruction in subjects connected with Agriculture, but which are not provided for by the regular staff of the College, to be obtained either in the Classes of the Glasgow and West of Scotland Technical College (or from lecturers supplied by that institution), or at Glasgow University, or, in the case of special subjects not provided for in these institutions, in such manner as the Governors shall direct.

6. Further extensions of the work at these or other centres to be at the discretion of the Governors, who shall also determine in what manner they shall provide for the management of the various institutions under their charge.

Scotch Education Department,
Dover House, Whitehall,
May, 1899.

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NAME.

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| A. G. BARNS GRAHAM, | ... | ... | ... | ... | ... |
| PROFESSOR G. W. GREGORY, D.Sc., F.R.S., | ... | ... | ... | ... | ... |
| PROVOST GEMMILL, | ... | ... | ... | ... | ... |
| ALEX. HAMILTON, | ... | ... | ... | ... | ... |
| THOMAS HUNTER, | ... | ... | ... | ... | ... |
| ROBERT INGLIS, | ... | ... | ... | ... | ... |
| JAMES JOHNSTONE, F.S.I., | ... | ... | ... | ... | ... |
| JOHN MACLACHLAN, of MacLachlan, | ... | ... | ... | ... | ... |
| D. C. M'VAIL, M.B., | ... | ... | ... | ... | ... |
| WILLIAM MALCOLM, M.A., | ... | ... | ... | ... | ... |
| JOHN M. MARTIN, | ... | ... | ... | ... | ... |
| J. DENNISTOUN MITCHELL, B.A., B.Sc., B.C.L., LL.B., | ... | ... | ... | ... | ... |
| REV. JAMES MURRAY, M.A., | ... | ... | ... | ... | ... |
| J. CAMPBELL MURRAY, | ... | ... | ... | ... | ... |
| W. WATSON MURRAY, | ... | ... | ... | ... | ... |
| JOHN POLLOCK, Jr., | ... | ... | ... | ... | ... |
| W. H. RALSTON, | ... | ... | ... | ... | ... |
| PETER REID, F.H.A.S., | ... | ... | ... | ... | ... |
| WILLIAM RUSSELL, | ... | ... | ... | ... | ... |
| JOHN D. SCOTT, | ... | ... | ... | ... | ... |
| THOMAS SMITH, | ... | ... | ... | ... | ... |
| JOHN SPEIR, | ... | ... | ... | ... | ... |
| J. W. STEWART, C.A., | ... | ... | ... | ... | ... |
| H. F. STOCKDALE, F.R.S.E., | ... | ... | ... | ... | ... |
| PETER TAYLOR, | ... | ... | ... | ... | ... |
| WILLIAM TEMPLETON, | ... | ... | ... | ... | ... |
| J. HARLING TURNER, F.S.I., | ... | ... | ... | ... | ... |
| BAILIE WM. WALLACE, | ... | ... | ... | ... | ... |
| ALEXANDER WILLISON, | ... | ... | ... | ... | ... |
| DAVID WILSON, M.A., D.Sc., | ... | ... | ... | ... | ... |
| JOHN WILSON, D.L., | ... | ... | ... | ... | ... |

ADDRESS.

ELECTING BODY.

| | | |
|-----|---|--|
| | Mouswald Manse, Ruthwell, R.S.O., Dumfries, | Highland and Agricultural Society. |
| | Cleveden, Kelvinside, Glasgow, ... | G. & W. of S. Tech. College. |
| | Norwood, Lockerbie, ... | Dumfries County Council. |
| | Tererran, Moniaive, ... | Dumfries County Council. |
| 17 | Stanhope Street, Glasgow, ... | G. & W. of S. Tech. College. |
| 32 | Stirling Road, Glasgow, ... | Corporation of Glasgow. |
| 19 | Hope Street, Glasgow, ... | Governors. |
| | Ladyton, Galston, ... | Ayr County Council. |
| | Strabane, Brodick, ... | Bute County Council. |
| | Cargen, Dumfries, ... | Kirkcudbright County Council. |
| 8 | Highburgh Terrace, Dowanhill, Glasgow, Gallamuir, Bannockburn, ... | G. & W. of S. Tech. College. Stirling County Council. |
| | Boturich Castle, Balloch, ... | Governors. |
| | Dunjop, Castle-Douglas, ... | Kirkcudbright County Council. |
| | Craigallian, Milngavie, ... | Lanark County Council. |
| | The University, ... | Glasgow University. |
| | Kilmarnock, ... | Kilmarnock Town Council. |
| | Bellshill, ... | Lanark County Council. |
| | The Square, Cumnock, ... | Ayr County Council. |
| | Lovestone, Girvan, ... | Ayr County Council. |
| | Alloway Cottage, Ayr, ... | Ayr County Council. |
| 48 | Castle Terrace, Edinburgh, ... | Argyll County Council. |
| 3 | St. James' Terrace, Glasgow, ... | Glasgow University. |
| | County Buildings, Hamilton, ... | Lanark County Council. |
| | Craufurd Bank, Lasswade, Midlothian, ... | Highland and Agricul. Society |
| | Carwood, Biggar, ... | Lanark County Council. |
| | The Manse, Kilmacolm, ... | Renfrew County Council. |
| 216 | West George Street, ... | Governors. |
| | Cotter House, Drymen, ... | Perth County Council. |
| | Springside, Howwood, ... | Renfrew County Council. |
| | Dunragit, Wigtownshire, ... | Kilmarnock Dairy School. |
| | Port-Ellen, Islay, ... | Argyll County Council. |
| | Luss Estate Office, Helensburgh, ... | Dunbarton County Council. |
| | Ellenbank, Lesmahagow, ... | Lanark County Council. |
| | The Castle, Maybole, ... | Ayr County Council. |
| | Newton Farm, Newton, ... | Governors. |
| 150 | Hope Street, Glasgow, ... | Dunbarton County Council. |
| | George Street, Glasgow, ... | G. & W. of S. Tech. College. |
| | Crews, Glenluce, ... | Wigtown County Council. |
| | Torland, Netherburn, ... | Lanark County Council. |
| | Cessnock, Galston, ... | Kilmarnock Dairy School. |
| | Graham Square, Glasgow, ... | Corporation of Glasgow. |
| | Easterhill, Dalry, ... | Ayr County Council. |
| | Carbeth, Killearn, ... | Stirling County Council. |
| | Finnich Malise, Drymen, ... | G. & W. of S. Tech. College. |

CHAIRMAN'S COMMITTEE.

| | |
|------------------|-------------------|
| Dr. Gillespie. | J. W. Stewart. |
| James Johnstone. | Dr. David Wilson. |

FINANCE COMMITTEE.

| | |
|---------------------|---------------------|
| Walter W. Blackie. | William Malcolm. |
| Alexander Cross. | W. Watson Murray. |
| R. E. Findlay. | J. Campbell Murray. |
| Rev. Dr. Gillespie. | John D. Scott. |
| Edward Gordon. | Thomas Russell. |
| Provost Gemmill. | Professor Stewart. |
| Thomas Hunter. | J. W. Stewart. |
| Robert Inglis. | J. Harling Turner. |
| James Johnstone. | Dr. David Wilson. |
| John Maclachlan. | John Wilson. |

J. W. Stewart, *Convener*.

TEACHING AND STAFF COMMITTEE.

| | |
|------------------------|-------------------------|
| John M. Aitken. | John M. Martin. |
| Hugh Brechin. | J. Dennistoun Mitchell. |
| Colonel R. F. Dudgeon. | Rev. James Murray. |
| Dr. Henry Dyer. | J. Campbell Murray. |
| Rev. Dr. Gillespie. | Thomas Russell. |
| Edward Gordon. | Thomas Smith. |
| A. G. Barns Graham. | John Speir. |
| Professor Gregory. | J. W. Stewart. |
| Thomas Hunter. | H. F. Stockdale. |
| James Johnstone. | Dr. David Wilson. |
| Dr. D. C. M'Vail. | John Wilson. |
| William Malcolm. | |

Dr. David Wilson, *Convener*.

DAIRY, FARM, AND EXPERIMENTS COMMITTEE.

William Barber.
 Alexander Cross.
 James R. Dempster.
 A. Hugh Douglas.
 Colonel R. F. Dudgeon.
 John Edmond.
 R. E. Findlay.
 Rev. Dr. Gillespie.
 Edward Gordon.
 Thomas Hunter.
 James Johnstone.
 John Pollock, Jr.
 W. H. Ralston.

Peter Reid.
 Thomas Russell.
 William Russell.
 Thos. Smith.
 John Speir.
 J. W. Stewart.
 Peter Taylor.
 William Templeton.
 J. Harling Turner.
 Bailie Wallace.
 Alexander Willison.
 Dr. David Wilson.

Jas. Johnstone, *Convener*.

LIVE STOCK COMMITTEE.

Hugh Brechin.
 Alexander Cross.
 James R. Dempster.
 Rev. Dr. Gillespie.
 Edward Gordon.

James Johnstone.
 John M. Martin.
 J. Dennistoun Mitchell.
 John Speir.
 Alexander Willison.

STAFF.

Principal—PROFESSOR R. PATRICK WRIGHT.

Professors.

| | |
|-------------------------|---|
| Agriculture, - | R. PATRICK WRIGHT, F.H.A.S., F.R.S.E. |
| Agricultural Botany, | A. N. M'ALPINE, B.Sc.(Lond.), Assoc.R.C.S. |
| Agricultural Chemistry, | ✓ REGINALD A. BERRY, F.I.C., F.C.S. |

Lecturers.

| | |
|------------------------------|---|
| Agriculture and Dairying, | JAMES M'CUTCHEON, F.C.S. |
| Agriculture, | WM. G. R. PATERSON, B.Sc., N.D.A. (Hons.) |
| Do., | JOHN BROWN, B.Sc., N.D.A. |
| Do., | ✓ JOHN GILLIES, N.D.A., N.D.D., C.D.A. |
| Dairying and Agriculture, | WM. STEVENSON, B.Sc., N.D.A., N.D.D. |
| Agricultural Zoology, | JAMES J. F. X. KING, F.E.S. |
| Bacteriology, | R. M. BUCHANAN, M.B., C.M. |
| Veterinary Science, | JAMES M'CALL (Principal of Veter- inary College) and Professor JOHN K. M'CALL, M.R.C.V.S. |
| Book-keeping, | DANIEL K. ROBB, F.H.A.S. |
| Agricultural Engineering, | HARRY BAMFORD, M.Sc., A.M.I.C.E. |
| Forestry, | JOHN NISBET, D.Cec., F.R.S. |
| Geology, | |
| Agricultural Surveying, | RICHARD HENDERSON, F.H.A.S., P.A.S.I. |
| Agricultural Law, | DAVID BRUCE, M.A., LL.B. |
| Poultry and Poultry-keeping, | ✓ AGNES KINROSS, N.D.D. |
| Bees and Bee-keeping, | Rev. R. M'CLELLAND. |
| Horticulture, | A. HOSKING. |
| Bacon-curing, | T. HOWARD STEVEN. |

Assistants.

| | |
|--------------|---|
| Agriculture, | RENWICK H. LEITCH, M.A., B.Sc., N.D.A. |
| Do., | THOMAS LIMOND, N.D.A., C.D.A.D. (Glas.). |
| Botany, | JOHN DUNLOP, B.Sc., N.D.A. (Hons.), N.D.D. |
| Chemistry, | HARRY GREEN. |

Dairy School.

| | |
|-------------------------------|---------------------|
| Instructor in Cheesemaking, | R. J. DRUMMOND. |
| Assistant in Cheesemaking, | JAMES GOW, N.D.D. |
| Instructress in Buttermaking, | ELLA STREET, N.D.D. |
| Dairymaid, | MARY M'LELLAN. |

Extension Dairy Instructresses.

BESSIE R. KIRKWOOD, N.D.D. | ANNIE C. SPEIR, N.D.D.
LILY STRANG, N.D.D.

Experiment Station.

Superintendent, ✓ JAS. JOHNSTON, N.D.A., P.A.S.I.

SECY. AND TREAS., JOHN CUTHBERTSON, F.R.S.E., F.E.I.S.

Clerk—ELLIE A. KIRKWOOD. | Janitor—ANDREW M'COWATT.

LIST OF CLASSES.

(A) DAY CLASSES.

| Subject. | No. of Hours. | Syllab's Page. | Days and Hours. |
|---------------------------------|------------------|-------------------|--|
| Agriculture (Soils and Manures) | 40 | 49 | Tu. & Th., 3-4 |
| Do. (Advanced) | 100 | 50 | Daily, 9.30-10.30 |
| †Botany, Junior | 50 | 55 | Tu. & Th., 10.30-11.30 |
| Do., do. (Practical) | 100 | 56 | Tu. & Th., 11.30-1.30 |
| Do., Senior | 50 | 56 | M., W., & F., 10.30-11.30 |
| Do., do. (Practical) | 100 | 58 | M., W., & F., 11.30-1.30 |
| Do., for Veterinary Students | 50 | 58 | M. & Th., 3-4 |
| †Chemistry, Junior | 50 | 51 | M., W., & F., 10.30-11.30 |
| Do., do. (Practical) | 100 | 51 | M., W., & F., 11.30-1.30 |
| Do., Senior | 50 | 52 | { M., W., & F. before Christ- mas, M. and F. after Christmas, 2.30-3.30 p.m. |
| Do., do. (Practical) | 30 | 53 | W., 3-6 p.m., after Christmas |
| Do., Agricultural | 50 | 53 | Tu. & Thu., 10.30-11.30 |
| Do., do. (Practical) | 100 | 54 | Tu. & Thu., 11.30-1.30 |
| *Economic Science | 100 | — | Daily, 2-3 |
| Engineering (Agricultural) | 60 | 65 | { M., Tu., W., & F. before Christmas, M., W., F. after Christmas, 3.15-4.15 |
| * Do. (Field Work) | 60 | — | M., W., & F., 10-11 |
| Forestry | 60 | 59 | M., W., & F., 4-5 |
| Geology | 120 | 67 | M., W., F., 3.30-5.30 p.m. |
| *Mathematics | 100 | — | Daily, 9-10 or 12-1 |
| *Natural Philosophy | 100 | — | Daily, 9-10 |
| Veterinary Science | 50 | 64 | { M., W., & F. before Christ- mas, M., & F. after Christmas |
| Zoology, Agricultural | 40 | 63 | Tu. & Th., 4.30-5.30 |

(B) EVENING CLASSES.

| | | | |
|-----------------------------|----|----|----------------------|
| Agriculture, Junior | 20 | 68 | Wednesday, 6.45-7.45 |
| Do., Senior | 40 | 68 | Tuesday, 6.45-8.45 |
| Bacteriology | 10 | 70 | Thursday, 6.45-7.45 |
| Bookkeeping | 40 | 75 | Monday, 6.45-8.45 |
| Botany, Junior | 20 | 72 | Tuesday, 6.45-7.45 |
| Do., Senior | 40 | 72 | Thursday, 6.45-8.45 |
| Chemistry, Junior | 20 | 71 | Wednesday, 7.45-8.45 |
| Do., Senior | 40 | 71 | Thursday, 6.45-8.45 |
| Dairying | 20 | 69 | Thursday, 7.45-8.45 |
| Forestry, Part I., | 20 | 73 | Monday, 7.15-8.15 |
| Do., „ II., | 20 | 73 | Friday, 7.15-8.15 |
| Horticulture | 20 | 74 | Tuesday, 7.45-8.45 |
| Law | 20 | 76 | Wednesday, 6.45-7.45 |
| Surveying | 20 | 75 | Friday, 6.25-7.25 |
| Timbers and Timbermeasuring | 20 | 74 | Wednesday, 7.15-8.15 |

* University Class. † The 10.30-1.30 Classes in Botany and Chemistry, which meet on M., W., & F., before Christmas, meet on Tu. and Th. after Christmas, and *vice versa*.

SESSION 1908-1909.

The Classes of the College are arranged in a Winter and a Summer Session.

The Winter Classes are held in the College Buildings, 6 Blythswood Square, Glasgow.

The Winter Session will commence on 14th October, 1908, and will be continued until 18th March, 1909.

The Principal, Professors, and Lecturers will be in their class-rooms at 6 Blythswood Square, Glasgow, on

13th October, from 7 to 9 p.m., and on

14th October, from 10 a.m. to 3 p.m.,

to give information to intending students and to receive enrolments.

INTRODUCTORY LECTURE.

The Introductory Lecture, which is open to all students and others interested, will be delivered on Wednesday Evening, 14th October, at 8 o'clock.

ENROLMENT AND FEES.

All fees are payable at the beginning of the session. Students may be enrolled daily at the office, 6 Blythswood Square, on and after 14th October, between the hours of 10 a.m. and 3 p.m., and at 7 o'clock in the evening.

Students who are ratepayers, or whose supporting parents or guardians are ratepayers, in the administrative districts of any of the Councils contributing to the support of the College, will be admitted to all the classes of the College

on payment of three-fourths of the usual fees, excepting only classes for which the fee does not exceed five shillings, and the Composition Fees for the courses, on which no reduction will be made. The Councils at present contributing are the County Councils of Ayr, Argyll, Bute and Arran, Dumfries, Dunbarton, Kirkcudbright, Lanark, Perth, Renfrew, Stirling, and Wigtown, and the Town Councils of Glasgow and Kilmarnock. Students claiming abatement of fees should produce a certificate from their town or county clerk.

In addition to the class fees, students attending University Classes must pay at the University a Matriculation Fee of £1 rs. per Session.

Students who have passed the Preliminary Examination of the University, and who are attending classes qualifying for the B.Sc. Degree in Agriculture are eligible to have their fees paid by the Carnegie Trust. Further particulars may be obtained on application to Wm. S. M'Cormick, M.A., LL.D., Secretary to the Carnegie Trust, The Merchants' Hall, Hanover Street, Edinburgh.

COURSES OF STUDY.

Students are recommended to attend a complete course of study which will enable them to gain one or other of the Diplomas and Degrees open to students of Agriculture, Dairying, and Forestry. Some of the following courses of study have been arranged in conjunction with the University of Glasgow. The classes may be taken in any order found convenient, but that given in the appended Tables is recommended.

The Certificates and Diplomas open to students of Agriculture, Dairying, and Forestry are—

I.—IN AGRICULTURE.

- (a) The Associateship in Agriculture of the College.
- (b) The College Diploma and Fellowship in Agriculture.
- (c) The National Diploma in Agriculture.
- (d) The Associateship and Fellowship of the Surveyors' Institution.
- (e) The Degree of Bachelor of Science in Agriculture.

II.—IN FORESTRY.

- (a) The College Certificates in Forestry.
- (b) The Highland Society's Certificates in Forestry.

III.—IN DAIRYING.

- (a) The College Certificates in Dairying.
- (b) The College Diploma in Dairying.
- (c) The National Diploma in Dairying.

THE COLLEGE ASSOCIATESHIP.

The Associateship in Agriculture of the College will be awarded to students who have attended the following courses of instruction and who have passed the necessary examinations. The course of study is arranged to be completed in two Winter Sessions, but students who desire to do so may extend their course over three sessions.

COURSE FOR ASSOCIATESHIP.

FIRST YEAR.

| Classes. | Days. | Hours. | Fees.* |
|----------------------------------|-------------|----------------------|-------------------|
| General Chemistry, | M., W., F., | 10.30—11.30 a.m. | £ s. d. 1 11 6 |
| Practical Chemistry, | M., W., F., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Agricultural Botany (Junior), | Tu., Th., | 10.30—11.30 a.m. | 1 11 6 |
| Practical Botany (Junior), | Tu., Th., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Agricultural Zoology, | Tu., Th., | 4.30—5.30 p.m. | 1 11 6 |
| Surveying,† | Friday, | 6.25—7.25 p.m. | 1 1 0 |
| Soils and Manures, | Tu., Th., | 3—4 p.m. | 1 11 6 |
| Book-keeping, | M., | 6.45—8.45 p.m. | 1 1 0 |

* Special Composition Fee for the above Classes, £7 7s.

† This Course includes 15 Lessons in Practical Surveying to be given on Saturdays.

SECOND YEAR.

| Classes. | Days. | Hours. | Fees.* |
|-----------------------|-------------|----------------------|---------|
| Agriculture (Senior), | Daily, | 9.30—10.30 a.m. | £ s. d. |
| Dairying, | Th., | 7.45—8.45 p.m. | 3 3 0 |
| Agricul. Chemistry, | Tu., Th., | 10.30—11.30 a.m. | 0 10 6 |
| Practical Chemistry, | Th., Th., | 11.30 a.m.—1.30 p.m. | 1 11 6 |
| Agricultural Botany | M., W., F., | 10.30—11.30 a.m. | 3 3 0 |
| (Senior), | | | 1 11 6 |
| Practical Botany | M., W., F., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| (Senior), | | | |
| Veterinary Science,† | M., W., F., | 4.30—6 p.m. | 3 3 0 |

* Special Composition Fee for the above Classes, £8 8s.

† Veterinary College, Buccleuch Street.

REGULATIONS FOR COLLEGE DIPLOMA.

1. The Diploma of the College shall be awarded in the Departments of Agriculture and Dairying.

2. The Diploma shall be awarded to students who have completed a course of study extending over three Winter Sessions, or in the case of Dairying, two Winter and one Summer Session, in accordance with the regulations, and who have passed the necessary examinations.

3. The title shall be College Diploma in Agriculture, C.D.A. (Glas.), and College Diploma in Dairying, C.D.D. (Glas.), or College Diploma in Agriculture and Dairying, C.D.A.D. (Glas.).

4. The Fellowship of the College may, at the discretion of the Governors, be granted to applicants who have held the College Diploma for at least three years, and have given satisfactory evidence of more advanced study, or of original work in one or more branches of agricultural research. The title shall be Fellow of the Agricultural College, F.A.C. (Glas.).

5. An Associateship in Agriculture shall be awarded to students completing a course of two Winter Sessions in accordance with the regulations, and passing the necessary examinations. The title shall be Associate of the Agricultural College, Assoc. A.C. (Glas.).

6. The subjects of study for the Diploma in the Department of Agriculture shall be (1) Chemistry, (2) Geology, (3) Botany, (4) Mensuration and Land Surveying, or Field Engineering, (5) Book-keeping, (6) Agricultural Chemistry, (7) Agricultural Botany, (8) Agricultural Zoology, (9) Agricultural Engineering, (10) Veterinary Science, and (11) Agriculture.

7. Candidates who satisfy the examiners in any of the following subjects, shall have an entry made on their Diploma to that effect :—

- (a) Forestry.
- (b) Horticulture.
- (c) Bacteriology.

8. The subjects of study for the Associateship shall be the same as for the Diploma, save that Geology and Agricultural Engineering may be omitted, and the examination in General Chemistry shall cover only the subjects included in the First Winter's Course. The regulations for optional subjects shall be the same as for the Diploma.

9. The subjects of study for the Diploma in the Department of Dairying shall be (1) Chemistry, covering only the subjects included in the First Winter's Course, (2) Botany, (3) Book-keeping, (4) Dairy Bacteriology, (5) Poultry, (6) Agricultural, including Dairy Chemistry, (7) Agricultural Botany, (8) Agricultural Zoology, (9) Veterinary Science, (10) Agriculture, including Dairying and Dairy Farming, (11) Practical Dairy Work (Milking, Buttermaking, and Cheesemaking).

10. Candidates shall not be eligible for any examination until they have completed their attendance at, and have presented certificates that they have satisfactorily performed the work of the qualifying classes.

11. The qualifying classes for the examination shall be :—
In Agriculture—

- (a) The Classes forming the Diploma Course of the College.
- (b) Classes in the other two Scottish Agricultural Colleges and English and Irish Agricultural Colleges in receipt of annual

grants from the Board of Agriculture, or classes in Colleges or Universities associated with or recognised by these Colleges, provided that not fewer than six of the subjects, as detailed in par. 6, be taken at Classes in the College.

In Dairying—

- (a) The classes forming the Diploma course of the College.
- (b) Classes in the other two Scottish Agricultural Colleges provided that candidates have attended the classes qualifying for the Senior Certificate in Dairying at the Dairy School. Classes in the English and Irish Colleges will be recognised as for the Diploma in the Department of Agriculture.

12. Candidates for a Diploma who have completed a course of study (Theoretical and Practical) in (1) Chemistry, (2) Geology, (3) Botany, (4) Mensuration and Land Surveying, or Field Engineering, qualifying for a degree in Science or in Arts of any University in the United Kingdom, or for the Diploma of a Central Institution recognised by the Scotch Education Department, and have passed the corresponding examinations of such University or Central Institution, or of the Agricultural College itself, may be held to have qualified in such subject or subjects. Candidates for the Diploma in Dairying who have attended classes in the prescribed subjects in any of the three Scottish Agricultural Colleges, and who have passed the corresponding examinations, will be held to have qualified in such subjects; but all candidates must attend at the Dairy School the courses of study (theoretical and practical) prescribed for the Senior Certificate in Dairying, and pass the examinations required for that Certificate.

13. The examinations in the College shall be conducted by an Examining Committee consisting of:—

- (a) The professors and instructors responsible for the several classes forming the Diploma Course.
- (b) Three Governors of the College.
- (c) Assessors, external to the College, who shall be appointed annually and paid by the Governors, and shall be approved by the Scotch Education Department: provided that, in the event of a Joint-Committee of two representatives from each of the three Scottish Agricultural Colleges being appointed,

the assessors shall be selected from a list drawn up and revised from time to time by that Committee. No assessor shall act for more than three consecutive years.

14. There shall be three examinations for the Diploma and two for the Associateship of the College to be held at the close of each Session, which examinations shall be entirely in the hands of the Examining Committee appointed by the College, provided that

- (a) The Governors shall decide from time to time as to the subjects, if any, for which external assessors shall not be employed.
- (b) The attainments of the candidates shall be judged by the record of their class work and examinations, in conjunction with the special examinations for the Diploma.
- (c) Candidates who fail to pass in any of the subjects taken at any examination shall only require to submit themselves for re-examination in the subject or subjects in which they have failed.
- (d) The examination papers shall be published in the Calendar of the College.

15. Before the Diploma in Agriculture of the College is issued to a candidate, such candidate shall be required to produce evidence of having resided for at least one year on a farm approved by one of the assessors.

16. Associates of the College who obtain the Diploma of the College shall thereafter cease to be Associates, and shall not be entitled to use the designation Associate after their names; and holders of the Diploma who are granted the Fellowship of the College shall cease to be holders of the Diploma, and shall not be entitled to use that designation after their names.

17. The Diploma shall be signed by the Chairman, the Principal, and the Secretary of the College, shall bear the Seal of the College, and an outline of the course of study in respect of which it is granted, and shall be submitted for endorsement to the Scotch Education Department.

EXAMINATIONS FOR ASSOCIATESHIP AND COLLEGE DIPLOMA IN AGRICULTURE.

1. The subjects required for the Associateship and the Diploma in Agriculture should be taken in the order prescribed in the respective courses of study. See p. 22 for Associateship Course, and p. 30 for Diploma Course.

2. Examinations are held at the close of each Winter Session on all the subjects comprised in the session's study. The scope of each examination is indicated by the Class Syllabuses. A second examination in the whole subjects of each session will be held if necessary in October.

3. In the examinations held at the end of the First Winter Session the following subjects must be included in the subjects taken by both Associateship and Diploma Candidates :—(1) General Chemistry, (2) Practical Chemistry, (3) Junior Botany, (4) Practical Botany.

4. In the examinations held at the end of the Second Winter Session the following subjects must be included by Associateship Candidates :—(1) Agricultural Chemistry, (2) Practical Chemistry, (3) Agricultural Botany, (4) Practical Botany; and the following must be included by Diploma Candidates :—(1) General Chemistry, (2) Practical Chemistry, (3) Agricultural Botany, (4) Practical Botany.

5. In the examinations held at the end of the Third Winter Session the following subjects must be included by Diploma Candidates :—(1) Agriculture, (2) Agricultural Chemistry, (3) Practical Chemistry, (4) Engineering.

DATES OF EXAMINATIONS.

OCTOBER, 1908.—The Examinations will, if necessary, be held during the week beginning Monday, 5th October. Names of Candidates, with subjects, must be entered with Principal Wright on or before 19th September.

MARCH, 1909.—The Examinations will be held during the week commencing Monday, 22nd March. Names of Candidates, with subjects, must be entered with Principal Wright on or before 5th March.

THE NATIONAL DIPLOMA IN AGRICULTURE.

This Diploma is awarded conjointly by the Highland and Agricultural Society of Scotland and the Royal Agricultural Society of England on the results of two examinations.

The Regulations of the Examinations for the National Diploma in the Science and Practice of Agriculture are as follows :—

1. The Societies may hold conjointly, under the management of the National Agricultural Examination Board appointed by them, an annual examination in the Science and Practice of Agriculture, at a convenient centre.

2. Candidates who pass the examination will receive the National Diploma in Agriculture—the Diploma to be distinguished shortly by the letters “N.D.A.”

3. The examination will be conducted by means of written papers and oral examinations.

4. The examination must be taken in Two Parts, as follows :—

First Part.

1. Agricultural Botany.
2. Mensuration and Land Surveying (or Agricultural Book-keeping).
3. General Chemistry.
4. Geology.
5. Agricultural Zoology.

Second Part.

6. Practical Agriculture.
7. Agricultural Book-keeping (or Mensuration and Land Surveying).
8. Agricultural Chemistry.
9. Agricultural Engineering.
10. Veterinary Science.

5. The maximum number of marks obtainable and the minimum number of marks in each subject qualifying for the Diploma will be as follows :—

| SUBJECT. | <i>First Part.</i> | Max. No. of Marks. | Pass Marks for Diploma. |
|------------------------------------|--------------------|-----------------------|----------------------------|
| 1. Agricultural Botany, - | | 200 | 120 |
| 2. Mensuration and Land Surveying, | | 200 | 120 |
| 3. General Chemistry, | | 200 | 120 |
| 4. Geology, - | | 100 | 50 |
| 5. Agricultural Zoology, | | 100 | 50 |

| SUBJECT. | <i>Second Part.</i> | Max. No. of Marks. | Pass Marks for Diploma. |
|--------------------------------|---------------------|-----------------------|----------------------------|
| 6. Practical Agriculture, | | 500 | 300 |
| 7. Agricultural Book-keeping, | | 200 | 120 |
| 8. Agricultural Chemistry, | | 200 | 120 |
| 9. Agricultural Engineering, - | | 200 | 100 |
| 10. Veterinary Science, | | 100 | 50 |

6. A candidate who obtains not less than three-fourths (1,500) of the aggregate maximum marks (2,000) in the entire examination will receive the Diploma with Honours, provided (a) that he passes each of the two parts of the examination at the first attempt, and (b) that he obtains not less than three-fourths (375) of the maximum marks (500) in the subject of Practical Agriculture.

7. A candidate will not be entitled to take both parts of the examination at one time. A year at least must elapse between the passing of the First Part and sitting for the Second Part; and the Second Part must, except with the special permission of the Board, be taken within two years of the passing of the First Part.

8. A non-returnable fee of £1 will be required from each candidate for each part of the examination.

9. A candidate who fails to obtain pass marks in any of the subjects in Part I. must take the entire part again. A candidate who fails to obtain pass marks in more than one of the subjects in Part II. must take the entire part again. A candidate who fails in one subject only in Part II. may come up again for that subject alone.

10. Holders of the First Class Certificate of the Royal Agricultural Society of England and of the Diploma of the Highland and Agricultural Society of Scotland will not be eligible for this examination.

11. The Board reserve the right to postpone, abandon, or, in any way or at any time, modify an examination, and also to decline at any stage to admit any particular candidate to the examination.

Forms of application for permission to sit at the examination may be obtained from the Secretary to Examination Board, Royal Agricultural Society of England, 13 Hanover Square, London, W.; and Mr. JAMES MACDONALD, Secretary, Highland and Agricultural Society of Scotland, 3 George IV. Bridge, Edinburgh.

Attendance on the classes for three Winter Sessions, with residence on a farm during the summer months, is required to enable students to go forward to these examinations.

COURSES FOR COLLEGE DIPLOMA AND FOR THE
NATIONAL DIPLOMA IN AGRICULTURE.

FIRST YEAR.

| Classes. | Days. | Hours. | Fees.* |
|--|-------------|----------------------|-------------------|
| General Chemistry, | M., W., F., | 10.30—11.30 a.m. | £ s. d. 1 11 6 |
| Chemical Laboratory, | M., W., F., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Agricultural Botany (Junior), | Tu., Th., | 10.30—11.30 a.m. | 1 11 6 |
| Practical Agricultural Botany (Junior), | Tu., Th., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Surveying,† | Friday, | 6.25—7.25 p.m. | 1 1 0 |
| Junior Agriculture, | Wed., | 6.45—7.45 p.m. | 0 10 6 |
| Geology, | M., W., F., | 3.30—5.30 p.m. | 3 3 0 |

* Special Composition Fee for the above Classes, £7 7s.

† This Course includes 15 Lessons in Practical Surveying to be given on Saturdays.

SECOND YEAR.

| Classes. | Days. | Hours. | Fees.* |
|----------------------------------|--------------------|----------------------|-------------------|
| Agricultural Botany (Senior), | M., W., F., | 10.30—11.30 a.m. | £ s. d. 1 11 6 |
| Prac. Agric. Botany, | M., W., F., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Chemistry, | M., W., F.,† | 2.30—3.30 p.m., | 3 3 0 |
| Practical Chemistry,§ | M. & F.,‡ Wed., | 3—6 p.m., | |
| Soils and Manures, | Tu., Th., | 3—4 p.m., | 1 11 6 |
| Veterinary Science,¶ | M., W., F., | 4.30—6 p.m., | 3 3 0 |
| Agricultural Zoology, | Tu., Th., | 4.30—5.30 p.m., | 1 11 6 |

* Special Composition Fee for the above Classes, £7 7s.

† Before Christmas.

‡ After Christmas.

§ Beginning after Christmas.

¶ Veterinary College, Buccleuch Street.

THIRD YEAR.

| Classes. | Days. | Hours. | Fees.* |
|--------------------------------------|---------------|----------------------|------------------|
| Agriculture (Senior), | Daily, | 9.30—10.30 a.m. | £ s. d. 3 3 0 |
| Agricul. Chemistry, | Tu., Th., | 10.30—11.30 a.m. | 1 11 6 |
| Practical Agricultural Chemistry, | Tu., Th., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Engineering, | M. Tu. W. F., | 3.15—4.15 p.m. | 2 2 0 |
| Agricul. Laboratory, | 3rd Saturday, | 10.15 a.m.—1.15 p.m. | |
| Agricultural Book- keeping, | M., | 6.45—8.45 p.m. | 1 1 0 |
| Bacteriology, | Th., | 6.45—7.45 p.m. | 0 10 6 |
| Dairying, | Th., | 7.45—8.45 p.m. | 0 10 6 |

* Special Composition Fee for the above Classes, £6 6s.

NATIONAL DIPLOMA, COLLEGE DIPLOMA, AND
COLLEGE ASSOCIATESHIP COURSES.

Note.—The Chemistry and Botany Classes, which meet from 10.30—1.30, each consist of 50 Lectures; and the Class which meets on Mondays, Wednesdays, and Fridays *before* Christmas will meet on Tuesdays and Thursdays after Christmas, and *vice versa*.

The Class in Veterinary Science will meet on Monday, Wednesday, and Friday up till Christmas, and thereafter on Monday and Friday only.

Such time as is not spent in attendance on the regular classes can be advantageously employed by students in the study of practical agricultural chemistry in the chemical laboratories, and in visiting the College Experiment Station at Holmes Farm, Kilmarnock, the numerous farms in the West of Scotland on which experiments are being carried out for the College, and selected farms for the inspection of live stock and implements.

SURVEYORS' INSTITUTION—SCOTCH EXAMINATIONS.

Candidates of about 18 years of age, who must be (a) pupils of Land Agents or Surveyors, or (b) studying with a view to entering the profession at approved colleges, are admitted STUDENTS on passing a preliminary examination in:—Algebra—to Simple Equations; Euclid—Books I.-III.; History—English and Scotch; Composition and Writing from Dictation; Elements of One Language—Latin, French, German.

The PROFESSIONAL ASSOCIATE qualifying Examination is open to (a) Students between 20-21½ years of age, (b) Non-students over 21 years of age who have fulfilled certain conditions. The subjects of examination are:—

| Sub-Division 1 (Chiefly Land Agency). | Sub-Division 2 (Chiefly Valuation). | Sub-Division 3 (Chiefly Building). |
|---|---|--|
| <ol style="list-style-type: none"> 1. Land Surveying, Leveling, and Elements of Trigonometry. 2. Book-keeping. 3. Landlord and Tenant.—Elements of Law.—(Applicable to Scotland). 4. Agriculture.—(North Country Customs). 5. Farm Steadings, Construction of. 6. Land Drainage. 7. Geology and Composition of Soils. 8. Agricultural Chemistry (Parts 1, 2, and 3 of detailed Syllabus). | <ol style="list-style-type: none"> 1. Land Surveying, Leveling, and Elements of Trigonometry. 2. Book-keeping. 3. Landlord and Tenant.—Elements of Law.—(Applicable to Scotland). 4. Building Construction, Elements of. 5. Mensuration. 6. Conveyancing, Elements of. 7. Servitudes, Restrictions, Mutual Walls, and Water Rights, Law of. 8. Valuation Tables for Leases, Annuities, &c., Application and Use of. | <ol style="list-style-type: none"> 1. Land Surveying, Leveling, and Elements of Trigonometry. 2. Book-keeping. 3. Practical Measuring (Oral; Scottish Practice). 4. Schedules of Quantities. 5. Mensuration. 6. Composition and Properties of Stones and Cements. 7. Servitudes, Restrictions, Mutual Walls, and Building Contracts, Law of. 8. Constructive and Working Drawings. |

The FELLOWSHIP Examination is open to (a) Professional Associates of 25 years of age, (b) Any candidate over 30 years of age who has fulfilled certain conditions.

The subjects of examination for class (a) are :—

| Sub-Division 1 (Chiefly Land Agency). | Sub-Division 2 (Chiefly Valuation). | Sub-Division 3 (Chiefly Building). |
|--|---|--|
| <ol style="list-style-type: none"> 1. Forestry, Timber Valuing, and Measuring (Indoor). 2. Taxation and Assessment. 3. Botany of Grasses. 4. Agricultural Chemistry (Parts 1, 2, 3, 4, and 5 of detailed Syllabus). 5. Valuation Tables for Leases and Annuities, Application and Use of; also General Valuation Practice. 6. Arbitration, Law of. 7. Agricultural Law. 8. Report. | <ol style="list-style-type: none"> 1. Feuing Estates, Development of. 2. Taxation and Assessment. 3. Drainage and Sanitation. 4. Valuation, Principles and Practice of. 5. Arbitration, Law of. 6. Lands Clauses Acts. 7. Public Health, Law of. 8. Report. | <ol style="list-style-type: none"> 1. Schedules of Quantities (Advanced). 2. Drainage and Sanitation. 3. Building Regulations in Police and Public Health Acts. 4. Valuation Tables and Practice. 5. Arbitration, Law of. 6. Roadmaking. 7. Roofs, Construction of Iron and Timber. 8. Report. |

SCIENTIFIC AND SPECIAL SUBJECTS.

(Two of the following Subjects must be taken by each Candidate.)

Algebra (by Candidates in Sub-Divisions 1 and 3 only).

Animal Physiology (Sub-Division 1 only).

Fencing Estates, Development of (Sub-Divisions 1 and 3 only).

Hydrostatics.

Taxation and Assessment (Sub-Division 3 only).

Roadmaking (Sub-Divisions 1 and 2 only).

Drainage and Sanitation (Sub-Division 1 only).

Mechanics, Applied (Sub-Divisions 1 and 2).

Building Regulations (Sub-Divisions 1 and 2).

The subjects of examination for class (b) are :—

| Sub-Division 1 (Chiefly Land Agency). | Sub-Division 2 (Chiefly Valuation). | Sub-Division 3 (Chiefly Building). |
|--|---|---|
| 1. Landlord and Tenant. —Elements of Law. —(Applicable to Scotland). 2. Agriculture and Customs of Country. 3. Construction and Arrangement of Farm Steadings. 4. Forestry and Timber Measuring and Valuing (Indoor). 5. Land Drainage. 6. Geology and Composition of Soils, or Agricultural Chemistry. 7. Valuation, Principles and Practice of. Report. | 1. Landlord and Tenant. —Elements of Law. —(Applicable to Scotland). 2. Servitudes, Restrictions, Mutual Walls, and Water Rights, Elements of Law of. 3. Conveyancing, Elements of. 4. Taxation and Assessment. 5. Drainage and Sanitation. 6. Valuation, Principles and Practice of. 7. Lands Clauses Acts. 8. Fencing Estates, Development of. 9. Report. | 1. Schedules of Quantities (Advanced). 2. Constructive and Working Drawings. 3. Servitudes, Restrictions, Mutual Walls, and Building Contracts, Elements of Law of. 4. Building Regulations. 5. Roadmaking. 6. Drainage and Sanitation. 7. Valuation, Principles and Practice of. 8. Report. |

A copy of the Rules, and a detailed Syllabus of the Subjects, with Examples of Papers set, can be obtained (price 1/6) from the Local Honorary Secretary, Mr. W. FRASER, 209 St. Vincent Street, Glasgow.

COURSE FOR THE DEGREE OF B.Sc.

The Scottish Universities Commission has issued an Ordinance instituting a Bachelor of Science Degree in Agriculture in the University of Glasgow.

Candidates must, in the course of not less than three academical years, attend at least twelve courses of instruction, as follows, of which five full courses must be taken in the University of Glasgow:—

- I. Mathematics or Biology (*i.e.*, *Zoology and Botany).
[100 meetings.]
- II. Natural Philosophy. [100 meetings.]
- III. Chemistry. [100 meetings and three months in
Chemical Laboratory.]
- IV. Agriculture and Rural Economy. [100 meetings.]
- V. Agricultural Chemistry. [100 meetings.]
- VI. Geology. [75 meetings.]
- VII. Veterinary Hygiene. [50 meetings.]
- VIII. Agricultural Botany. [50 meetings.]
- IX. Agricultural Entomology. [25 meetings.]
- X. Economic Science as applied to Agriculture
[100 meetings.]
- XI. A course in one of the following:—
 - (a) Forestry. [50 meetings.]
 - (b) Experimental Physics. [50 meetings.]
 - (c) Engineering. [50 meetings.]
- XII. Engineering Field Work. [50 meetings.]

There shall be a First Science Examination in the three following subjects—viz., (1) Mathematics or Biology (*i.e.*, Zoology and Botany); (2) Natural Philosophy; (3) Chemistry.

Candidates may present themselves in any one or more of the subjects of the First Science Examination at any

* Professor King's Class in Zoology at St. Mungo's College (meeting for lectures, 1-2 p.m., and for practical work, 2-4 p.m.) is recognised by the University as qualifying for the first B.Sc. Examination in that subject.

examination held after they have attended a full course in the subject or subjects professed.

There shall be a Final Science Examination in the remaining subjects (4 to 12 inclusive).

Candidates may present themselves in any one or more of these subjects at any examination held after they have passed the whole of the subjects comprised in the First Science Examination, and have attended the required courses in the subjects professed.

Residence and practical work at a farm is required of each candidate, as stated in the following regulation :—

Residence and practical work at a farm shall be required of each candidate to such an extent and under such regulations as the Senatus, with the approval of the University Court, may from time to time appoint.

Under this Sub-section the following regulations have been made by the Senate, with the approval of the University Court :—

1. Residence and practical work at a farm for twelve months shall be required, and the candidate must not be under sixteen years of age when he commences the residence.
2. The residence must be for twelve consecutive months, except in special cases in which the Senate may grant recognition of residence during two shorter periods, amounting together to, at least, twelve months.
3. The candidate must produce evidence satisfactory to the Senate that he has fulfilled these regulations.

Students intending to qualify for this Degree are required to pass a Preliminary Examination.

UNIVERSITY PRELIMINARY EXAMINATION.

(1) The Subjects of this examination are—

1. English.
2. Latin or Greek.
3. Mathematics.
4. One of the following :—Latin or Greek (if not already taken), French, German, Italian (or such other language as the Senatus Academicus may approve), Dynamics.

(2) Students for the B.Sc. Degree in Agriculture may take French or German instead of Latin or Greek. Mathematics must be taken in the Intermediate or Higher Standard, but if the former then an additional modern language must be taken.

(3) The Preliminary Examination must be passed before the candidate presents himself for any part of the First Science Examination, but not necessarily before the candidate enters on his curriculum.

(4) The Scotch Education Department Leaving Certificate and certain other examinations are accepted as exempting candidates from the whole or part of the Preliminary Examination.

(5) Candidates are required to pass in all the required subjects at one or not more than two examinations, but they may offer themselves for re-examination as often as may be necessary to satisfy this condition.

(6) The detailed syllabus of each subject of the Preliminary Examination and the list of Exempting Examinations may be found in the Glasgow University Calendar, 1908-1909. Specimen examination papers are given in the Appendix of the University Calendar.

DATES OF UNIVERSITY EXAMINATIONS,
1908-1909.

PRELIMINARY EXAMINATION—Sept., 1908 ; March, 1909.

Entries must be made at the University Matriculation Office on or before 25th August, 1908, and 5th March, 1909. The examination fee is 10s. 6d.

B.Sc. DEGREE EXAMINATIONS—Sept., 1908; March, 1909.

Entries must be made at the University Matriculation Office on or before 16th September, 1908, and 8th March, 1909. The examination fee is £1 1s. per subject until £6 6s. shall have been paid.

SUMMER SESSION.—UNIVERSITY.

The following Science Classes at the University may be attended during the summer months :—

Zoology—(Advanced).

Botany—(Practical and Theoretical).

Physical Laboratory.

Chemistry—(Practical and Theoretical).

Organic Chemistry.

Further particulars regarding University Examinations, Classes, &c., will be found in the Calendar of the University of Glasgow.

CERTIFICATES IN FORESTRY..

The Course is for working youths and men only. It will extend over a period of 2½ years, during which time the student will be required to spend six months in Glasgow, taking the following classes throughout one Winter Session at the West of Scotland Agricultural College :—Forestry (100 hours), Botany (150 hours), Chemistry (150 hours), Soils and Manures (40 hours), Zoology (40 hours), Book-keeping (40 hours), and Surveying (35 hours). The Forestry

Experiment Station of the College at Kilmarnock will be visited occasionally during the College session. Students will also be required to spend eighteen months on an estate, where they will (1) perform the duties of a working forester, (2) keep a journal recording full details and costs of the work done each day, and (3) attend such lectures and examinations as the College shall decide to hold. The intention is to give weekly lectures at local centres for a certain period each year.

Only those willing and capable of performing the ordinary work of an estate will be received. They will have to work in the woods, or at any work ordinarily done by estate workmen, and will be under the same regulations.

Students must be between the ages of 15 and 20, inclusive, on the day of admission. Students over this age will only be admitted under special circumstances.

Periodical Examinations will be held in local centres by the instructor. At the end of the course a Final Examination, theoretical and practical, will be held, and certificates granted to students who satisfy the examiners. These certificates will be issued by the West of Scotland Agricultural College.

Misbehaviour or unsatisfactory progress during the course of study will render a student liable to immediate dismissal.

The College authorities will, if desired, advise proprietors who engage the students on all matters relating to the general management of their woods. Where possible, records of all planting will be kept for the use of the College and of the proprietors; in addition, experimental work will be conducted upon certain estates under direction of the College.

COURSE FOR THE COLLEGE CERTIFICATE.

| Classes. | Days. | Hours. | Fees.* |
|--------------------------------|-------------|----------------------|-------------------|
| Botany (Junior) | Tu., Th., | 10.30—11.30 a.m. | £ s. d. 1 11 6 |
| Do. (Practical) | Tu., Th., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| General Chemistry (Junior), | M., W., F., | 10.30—11.30 a.m. | 1 11 6 |
| General Chemistry (Practical), | M., W., F., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Soils and Manures, | Tu., Th., | 3—4 p.m. | 1 11 6 |
| Zoology, | Tu., Th., | 4.30—5.30 p.m. | 1 11 6 |
| Forestry, | M., W., F., | 4—5 p.m. | 3 3 0 |
| Surveying, | Friday, | 6.25—7.25 p.m. | 1 1 0 |
| Book-keeping | Monday, | 6.45—8.45 p.m. | 1 1 0 |

* Special Composition Fee for the above Classes, £8 8s.

Certificates in Forestry are also awarded by the Highland and Agricultural Society on the result of a Special Examination which is held in the Society's Rooms, 3 George IV. Bridge, Edinburgh. Forms of application and particulars may be obtained from Mr. James Macdonald at the above address.

Candidates must possess—1. A thorough acquaintance with the theory and practice of Forestry. 2. A general knowledge of the following branches of study so far as these apply to Forestry:—The Elements of Botany; the Elements of Physics, Chemistry, and Meteorology; Forest Entomology; Land and Timber Measuring and Surveying; Mechanics and Construction, as applied to fencing, draining, bridging, roadmaking and Sawmills; Implements of Forestry; Book-keeping and Accounts.

The examinations are open to candidates of any age, will be both written and oral, and will include such practical tests as may from time to time be found convenient to apply.

The maximum number of marks for each subject is 100; First Class marks in all subjects, 75; Second

Class marks in all subjects, 50; Pass marks in all subjects, 40.

To obtain the First Class Certificate, a candidate must have First Class marks in Forestry and any two of the other subjects, and Pass in the two remaining subjects. To obtain the Second Class Certificate, a candidate must obtain Second Class marks in Forestry, and in any two of the other subjects, and Pass in the two remaining subjects.

If a candidate has obtained First Class marks in Forestry, and failed in only one or two of the other subjects, he can come up again for examination in these subjects alone for the First Class Certificate, otherwise he must go through the entire examination again.

The following is a suitable Course for the Highland Society's Certificate:—

| Classes. | Days. | Hours. | Fees. |
|----------------------------|---------------|-----------------------|---------|
| Elementary Chem., | Wednesday, | 7.45—8.45 p.m., | £ S. D. |
| Chemistry, | M., W., F.,* | 2.30—3.30 p.m., | 0 10 6 |
| Practical Chemistry,† | M. & F.,† | | 3 3 0 |
| Surveying, | Wednesday, | 3—6 p.m., | |
| Book-keeping, | Friday, | 6.25—7.25 p.m., | 1 1 0 |
| Agricultural Zoology, | Mon., | 6.45—8.45 p.m., | 1 1 0 |
| Agricul. Engineering, | Tu. & Th., | 4.30—5.30 p.m., | 1 11 6 |
| Agricul. Laboratory, | M. Tu. W. F., | 3.15—4.15 p.m., | 2 2 0 |
| Forestry Day Class,§ | 3rd Saturday, | 10.15 a.m.—1.15 p.m., | |
| <i>Forestry, Part I.,</i> | M., W., F., | 4—5 p.m., | 3 3 0 |
| <i>Forestry, Part II.,</i> | Friday, | 7.15—8.15 p.m., | 0 10 6 |
| <i>Timbers and Timber-</i> | Monday, | 7.15—8.15 p.m., | 0 10 6 |
| <i>measuring,</i> | Wednesday, | 7.15—8.15 p.m., | 0 10 6 |

Students are recommended to take two sessions to this Course.

* Before Christmas.

† After Christmas.

‡ Begins after Christmas.

§ Students unable to attend the day class may take the evening classes.

COLLEGE DIPLOMA IN DAIRYING.

COURSES FOR THE COLLEGE DIPLOMA IN DAIRYING.

For full particulars, see page 23.

Part I.—First Winter.

| Classes. | Days. | Hours. | Fees.* |
|-----------------------|-------------|----------------------|---------|
| | | | £ s. d. |
| General Chemistry, | M., W., F., | 10.30—11.30 a.m. | 1 11 6 |
| Chem. Laboratory, | M., W., F., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| General Botany, | Tu., Th., | 10.30—11.30 a.m. | 1 11 0 |
| Practical Botany, | Tu., Th., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Soils and Manures, | Tu., Th., | 3—4 p.m. | 1 11 6 |
| Agricultural Zoology, | Tu., Th., | 4.30—5.30 p.m. | 1 11 6 |

* Special Composition Fee for above Classes, £5 10s.

Part II.—Summer Session.

AT THE DAIRY SCHOOL, KILMARNOCK.

Practical Dairy Work, including the Hand-milking of Cows, making of Butter and of hard and soft varieties of Cheese.

| | | | |
|------------------------------|-----|-----|---|
| Dairy Farming, | ... | ... | 20 Lectures. |
| Dairying (Senior Course), | ... | ... | 20 " |
| Dairy Chemistry, | ... | ... | 20 " |
| Agricultural Botany, | ... | ... | 20 " |
| Dairy and Farm Book-keeping, | ... | ... | 20 " |
| Poultry, | ... | ... | 5 " |
| Dairy Bacteriology, | ... | ... | 20 Lectures and Practical Work in Laboratory. |

Composition Fee, Scotch Students, £6; others, £7 10s.

Part III.—Second Winter.

| Classes. | Days. | Hours. | Fees.* |
|-----------------------|-------------|----------------------|---------|
| | | | £ s. d. |
| Senior Agriculture, | Dai'y, | 9.30—10.30 a.m. | 3 3 0 |
| Agricul. Chemistry, | Tu., Th., | 10.30—11.30 a.m. | 1 11 6 |
| Pract. Agric. Chem., | Tu., Th., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Agricultural Botany, | M., W., F., | 10.30—11.30 a.m. | 1 11 6 |
| Pract. Agric. Botany, | M., W., F., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Veterinary Science,† | M., W., F., | 4.30—6 p.m. | 3 3 0 |
| Bacteriology (Dairy), | Th., | 6.45—7.45 p.m. | 0 10 6 |

* Special Composition Fee for above Classes, £7 10s.

† Veterinary College, Buccleuch Street.

THE NATIONAL DIPLOMA IN DAIRYING.

This Diploma is granted conjointly by the Highland and Agricultural Society of Scotland and the Royal Agricultural Society of England, on the results of a Theoretical and Practical Examination, which is held at the Dairy School about the beginning of October.

The Regulations of the Examination for the National Diploma in the Science and Practice of Dairying are as follows :—

1. The Societies may hold annually in England and in Scotland, under the management of the National Agricultural Examination Board appointed by them, one or more examinations for the National Diploma in the Science and Practice of Dairying; the Diploma to be distinguished shortly by the letters "N.D.D."

2. The examinations will be held on dates and at places from time to time appointed and duly announced.

3. A deposit of £1 will be required from each candidate, which deposit will be returned only to those candidates who succeed in obtaining the Diploma at the first attempt. The Board may, at their discretion, allow an unsuccessful candidate to sit for one subsequent examination without payment of a further deposit.

4. Forms of entry for the examination in England may be obtained from the Secretary of the Royal Agricultural Society of England, 13 Hanover Square, London, W., and must be returned to him duly filled up, with the deposit of £1, on or before August 31st.

5. Forms of entry for the examination in Scotland may be obtained from the Secretary of the Highland and Agricultural Society of Scotland, 3 George IV. Bridge, Edinburgh, and must be returned to him duly filled up, with the deposit of £1, on or before August 31st.

6. A candidate may enter for the examination either in England or Scotland, but not in both, and a candidate who has once taken part in an examination in England cannot enter for an examination in Scotland, or *vice versa*. No candidate may sit for the examination more than twice.

7. A candidate will be required to satisfy the Examiners by means of written papers, practical work, and *viva voce*, that he or she has :—

- (1) A general knowledge of the management of a dairy farm, including the rearing and feeding of dairy stock, the candidate being required to satisfy the examiners that he or she has had a thorough training and practical experience in all the details of dairy work as pursued on a farm.
- (2) A thorough acquaintance, both practical and scientific, with everything connected with the management of a dairy, and the manufacture of butter and cheese.
- (3) Practical skill in dairying, to be tested by the making of butter and cheese.
- (4) Capacity for imparting instruction to others.

8. The Board reserve the right to postpone, to abandon, or in any way or at any time to modify an examination, and also to decline at any stage to admit any particular candidate to the examination.

Attendance on the Classes for one Winter Session, and at the Dairy School during the summer months, is required to enable students to go forward to this examination. The following is the course of classes recommended :—

COURSE FOR THE NATIONAL DIPLOMA IN DAIRYING.
WINTER SESSION.

| Classes. | Days. | Hours. | Fees.* |
|-----------------------|-------------|----------------------|---------|
| | | | £ s. d. |
| Agriculture (Senior), | Daily, | 9.30—10.30 a.m. | 3 3 0 |
| General Chemistry, | M., W., F., | 10.30—11.30 a.m. | 1 11 6 |
| Practical Chemistry, | M., W., F., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| Agricultural Botany | Tu., Th., | 10.30—11.30 a.m. | 1 11 6 |
| (Junior), | | | |
| Practical Botany | Tu., Th., | 11.30 a.m.—1.30 p.m. | 3 3 0 |
| (Junior), | | | |
| Veterinary Science,† | M., W., F., | 4.30—6 p.m. | 3 3 0 |
| Dairy Bacteriology, | Th., | 6.45—7.45 p.m. | 0 10 6 |
| Dairying, | Th., | 7.45—8.45 p.m. | 0 10 6 |

* Special Composition Fee for above Classes, £8 8s.

† Veterinary College, Buccleuch Street.

TEACHERS' CLASSES.

Under the auspices of the Glasgow Provincial Committee for the Training of Teachers, courses of study and practical work in Rural Knowledge and School Gardening are held at the Dairy School, Kilmarnock. Students in training attend one or two days per week, as may be arranged by the Committee, during the Summer Session, and allowances are granted to the students by the Department to cover the cost of travelling between Glasgow and Kilmarnock.

A Special Month's Course for Teachers in active service (Art. 55) is conducted at the Dairy School during the month of July. Students attend for about six hours per day during a period of four weeks.

Either of these courses, it is anticipated, will qualify those attending to give instruction in School Gardening as prescribed by the Scotch Code.

GROCERS' CLASS.

In conjunction with the Glasgow Grocers' and Provision Merchants' Association, a course of Lectures and Demonstrations will be given. The Lectures will commence on Tuesday evening, 13th October, and deal principally with "Milk," "Butter and Buttermaking," and "Cheese and Cheesemaking."

SUMMER SESSION (1909).

The Dairy School, Holmes Farm, Kilmarnock, will be open from end of March to end of September.

BURSARIES.

The following Bursaries are offered by the Governors of the College :—

- I. Five Bursaries of the value of £5 each are offered for competition to the Students attending the Junior Class of Agriculture. The Bursaries are tenable for one year only, and are awarded on the results of the Class Examinations. Students gaining these Bursaries are required to attend the Day Class in Agriculture in the succeeding Winter Session, or alternatively the Senior Evening Class of Agriculture, and one or other of the Senior Evening Classes of Agricultural Chemistry or Agricultural Botany.
- II. Two Bursaries of the value of £40 and £35 respectively, and tenable for four years, are offered for competition.
 1. Candidates must make application before the fourteenth day of August to Principal Wright, 6 Blythswood Square, Glasgow, from whom forms of application and full particulars may be obtained, and due notification will be sent to those approved by the Governors. Candidates not approved will not be allowed to present themselves for examination for these Bursaries.
 2. The Bursaries will be awarded chiefly on the results of the Science Preliminary and Bursary Examination in Glasgow University, held in September-October, but the Governors reserve to themselves power in appointing Bursars to give a preference to candidates whose previous education and training have given them a special interest in and connection with Agriculture.

The subjects of examination will be as follows :—

- (a) English (higher standard).
 - (b) Mathematics (higher standard).
 - (c) A Modern Language (higher standard) or Dynamics.
 - (d) Latin, or Greek, or another Modern Language (higher standard).
3. The successful candidates must attend the curriculum of classes in Glasgow, and comply with the conditions, and attend the classes required to qualify for the B.Sc. Degree in Agriculture at the University of Glasgow and for the National Diploma in Agriculture, and they must present themselves in regular course for the Degree and Diploma Examinations.
 4. It shall be competent to the Governors, at their discretion, to suspend a Bursar, or to deprive him of his Bursary, on the ground of his misconduct, or of his failure to obtain class Certificates, or to pass examinations, or because of his inability to produce evidence that he is prosecuting his studies in a satisfactory manner, of all which matters the Governors shall be the sole judges.
 5. The holders of the Bursaries must not, without consent of the Governors, prosecute any courses of study other than those required to prepare them for the examinations specified, and they must not be holders of any Scholarship or Bursary the conditions of which oblige them to attend classes other than those required by the conditions of the Bursaries awarded by this College.
 6. Payment of the first annual moiety of the Bursaries will be made at the Christmas Holidays, during the tenure of the Bursary.

The second moiety, at the end of the first and third years, will be paid at the close of the Winter Session; but in the second winter the second moiety will not be paid until the Bursar has passed the First Examination for the National Diploma in Agriculture, and the second moiety of the fourth year will not be paid until the Bursar has passed the Final Examination for the National Diploma in Agriculture, and has taken his B.Sc. Degree in the University.

COUNTY BURSARIES.

The County Council of Lanark award, on examination at each of the local courses in Dairying, Bursaries of £5 each for a complete course at the Dairy School. The railway fares of students attending the local classes in Agriculture or the Special Month's Course for Farmers may be paid on application.

The County Committee of Ayr propose awarding ten Bursaries of £4 each to young farmers attending the Special Month's Course for Farmers, five Bursaries of £4 each to young foresters attending the Special Month's Course for Foresters, and ten Bursaries of £3 each to pupils attending the Dairy School. Two Bursaries of £25, tenable for three years, are open to students of this College.

The County Council of Dunbarton pay railway fares of students attending Evening Classes in the College. Application must be made at the beginning of the Session. The County Council also offer a bursary of £25, tenable for two years, open to County pupils on condition that they attend for two winters the course of studies at the College prescribed in the Calendar as qualifying for the Diploma in Agriculture.

The County Council of Bute offer two Bursaries of £15 to students attending a complete session, and four Bursaries of £5 each to young farmers attending Special Farmers' Class.

The County Council of Perthshire propose to award ten Bursaries of £15 each, tenable for three years at this College or any approved Secondary School.

The County Committee of Dumfriesshire have agreed to recommend that two Bursaries of £10 and four of £2 10s., tenable at the Special Class for Farmers, be given annually in aid of Agricultural Education. The Committee also pay the fees, railway fare, and a sum of 2s. per day to pupils attending the Dairy School.

The Education Committee of Renfrewshire have agreed to recommend to the County Council the award during the current year of bursaries to students from the County who attend a Course of Instruction at the Dairy School, Kilmarnock, or the Course of Day Classes for Farmers to be held at the College.

The County Council of Kirkcudbright propose awarding Bursaries of £5 each to a limited number of pupils who attend the regular College Classes, or the Special Farmers Class. The Stewartry Dairy Association give grants of £1 15s. per week to pupils attending the Dairy School.

The County Council of Argyll have agreed to pay the class fees of six students taking the Course for the College Certificate in Forestry.

NOTE.—County schemes are subject to amendment. Students must apply to the County Clerks or the College Secretary for further particulars regarding the proposals of the above-mentioned or other Counties.



BOTANICAL LABORATORY.

[To face page 48.]

SYLLABUS OF CLASSES FOR WINTER SESSION, 1908-1909

(14th October, 1908, to 18th March, 1909).

Day Classes.

AGRICULTURE.

For Junior Course see Evening Class Syllabus, page 68.

INTERMEDIATE COURSE.

SOILS AND MANURES.

PROFESSOR WRIGHT.

ASSISTANT—MR. BROWN.

Tuesday and Thursday, 3 to 4 p.m. Commencing 15th October.

The course consists of 40 lectures, and will embrace the following subjects:—

Soils.—Their origin, variation, formation, properties, and classification. Their relation to the geological formations. Agricultural characters of soils on the various geological formations in Britain. Cultivation of soils.

Manures.—Objects and uses of manures. Classification of manures.

Nitrogenous Manures.—Nitrate of soda, sulphate of ammonia, soot, &c.

Bone Manures.—Bone meal, bone flour, dissolved bones, &c.

Mineral Phosphates.—Coprolites, superphosphate, basic slag, &c.

Potassic Manures.—Kainit, muriate of potash, sulphate of potash, nitrate of potash.

Salt and its uses as a manure.

Lime, Gas Lime, Chalk, Marl.—Their respective uses and values.

General Manures.—Peruvian and other guanos, blood and fish manures, seaweed, green manures.

Farmyard Manure.—Its composition and management, methods of utilisation, effects on crops.

Fee for the Course, £1 11s. 6d.

ADVANCED COURSE.

Daily, 9.30 to 10.30 a.m. Commencing 15th October.

Introductory lecture on Wednesday evening, 14th October, at 8 o'clock.

The course consists of 100 lectures, and will embrace the following subjects :—

Soils and Soil Improvement.—Exhaustion and fertility. Subsoiling. Clay burning. Theory and practice of *drainage*. Cost.

Meteorology.—The effects of climate on farming practice.

Rotations.—Principles of rotations. Rotations for different soils. Advantages of rotations.

Crops.—Cereal, root, and forage crops. Their origin, cultivation, treatment, cost, and yield. Selection and change of seed.

Diseases of Crops.—Rust, smut, mildew, finger-and-toe, potato disease, etc.

Weeds and Parasitic Plants.—The most troublesome weeds. Methods of prevention and eradication.

Manures.—Manurial treatment of each of the farm crops. Irrigation. Liquid manuring. Sewage.

Pastures.—Natural and artificial grasses and clovers. Formation of permanent and temporary pastures. Haymaking. Ensilage.

Motive Powers of the Farm.—Horse. Wind. Water. Steam. Electricity. Implements and machines. Buildings and fences.

Live Stock of the Farm.—Breeds of horses, cattle, sheep, and pigs. Points of breeds. Selection. Laws of breeding.

Management of all kinds of live stock from birth to maturity. Diets for milch stock, fattening cattle, sheep, and horses.

Farming Capital.—Costs of stocking and working farms. Farm valuations. Rent, taxes, and costs of labour.

Agricultural Holdings Acts.—Compensation for improvements.

Fee for the Course, £3 3s.

INSTRUCTION IN LIVE STOCK.

During Session 1908-09 systematic instruction in farm live stock will form a regular class subject for students of practical Agriculture. Expert judges of live stock will give practical demonstrations on the points of the chief breeds kept on farms. The practical demonstrations will be preceded by lectures and by lantern illustrations in the class-room. The meetings for demonstrations on live animals will, as far as practicable, be given on Saturdays.

Details of the places, times, terms, &c., will be announced in due course.

GENERAL CHEMISTRY.

PROFESSOR BERRY.

ASSISTANT—MR. GREEN.

JUNIOR COURSE.

*Monday, Wednesday, and Friday, 10.30 to 11.30.**Commencing 16th October.*

The course will consist of 50 lectures on general chemistry and its relations to agricultural processes and manufactures.

It will comprise:—

Physical changes in matter. Effect of heat and solvents. Latent heat. Sensible heat. Thermometry. Laws of Boyle and Charles. Crystals. Specific gravity and specific heat. Matter and energy. Pure substances and mixtures. Elements and compounds. Atomic weights, valency. Molecular weights. Symbolic notation and chemical equations. Laws of chemical combination. Gravimetric and volumetric methods of analysis. Chemical calculations. Oxygen and hydrogen. Oxidation and reduction. Analysis and synthesis of water. Impurities in natural waters. Hydrates. Acids, bases and salts. Carbon, sulphur, nitrogen, phosphorus, silicon, and boron, and their important inorganic compounds. The halogen elements. General characters of the metals. Metallurgy and chief ores. Principal compounds of the alkalies and alkaline earths, magnesium, zinc, iron, aluminium, lead, and copper. Organic chemistry. The more important carbohydrates, fats and proteid substances will be briefly considered.

Fee for the Course, £1 11s. 6d.

JUNIOR PRACTICAL CLASS.

*Monday, Wednesday, and Friday, 11.30 to 1.30.**Commencing 16th October.*

In this class each Student will be enabled to test chemical substances for himself, and gain some knowledge of practical analytical methods. The work will be mainly qualitative, including wet and dry-way methods of examination, the detection of impurities, and the identification of acids and bases entering into the composition of simple salts.

All Students attending the lectures are strongly recommended to take this class at the same time.

Fee for the Course (including Apparatus and Chemicals), £3 3s.

SENIOR COURSE.

Monday, Wednesday, Friday, before Christmas, } 2.30 to 3.30 p.m.
Monday, Friday, after Christmas, . }

This class meets the requirements of students who have previously attended an elementary course in General Chemistry and propose entering for the first division of the examination for the National Diploma in Agriculture, the Highland and Agricultural Society's Forestry Certificate, and other public examinations where General Chemistry is a prescribed subject. The course consists of Fifty Lectures, and will comprise :—

CHEMICAL PHYSICS.—Matter and energy—pure and mixed matter, methods of separating mixtures, simple and compound substances, kinetic and potential energy, transformation and conservation of energy. The solid, liquid, and gaseous states of matter, and the phenomena accompanying change of state. Heat—the measurement of heat, thermometers, calorimeter, the effects of heat and pressure on gases. Gaseous diffusion—vapour tension, the barometer. Mass and weight—the balance, specific gravity, density, hydrometry. Metric system of weights and measures.

INORGANIC CHEMISTRY.—The chief elements found in the commonest forms of matter. The atomic theory—molecular condition of matter, atomic and molecular weights. Chemical combination—symbolic notation, equations. Hydrogen—its compounds with chlorine, oxygen, nitrogen and carbon. Oxygen—oxidation, combustion, respiration. Water—natural waters, their impurities and purification. Acids, bases, salts. Carbon—its compounds with oxygen, sulphur, and nitrogen. Nitrogen—nitric acid, nitrates, and nitrites. Sulphur—sulphides, sulphuric and sulphurous acids, sulphates. Chlorine, bromine, iodine. Chlorides, chlorates, chloride of lime, bleaching. Phosphorous—phosphates, superphosphate. Silica—silicates. Arsenic. Metals—ores, general metallurgic processes. Alkalies—chief alkaline salts, alkalimetry, acidimetry. Lime—the chief lime compounds. Magnesium, zinc, iron, lead, copper, mercury, tin, silver, and their technically important salts.

ORGANIC CHEMISTRY.—Distillation of coal and wood, nature of chief products. Hydrocarbons, paraffins, olefines and their chief oxidation products, alcohols, aldehydes, acids. Fermentations—alcoholic, acetic, lactic, butyric. Carbohydrates—sugars, starch, cellulose, dextrine, gums. Fats, glycerol, saponification. Benzene, phenol. Tartaric, citric, and other common vegetable acids. Amines and amides, urea. Proteids, peptones, gelatine, &c.

Fee, £2 2s.

SENIOR PRACTICAL CLASS.

Wednesdays, 3 to 6 p.m. Beginning after Christmas.

The work of this class will include the qualitative examination of mixed salts. The preparation, identification, and separation, of some elementary organic substances. Gravimetric analysis of simple and mixed salts, and of some minerals. Volumetric analysis and preparation of standard solutions. Specific gravity, melting, boiling point determination, &c.

CHEMISTRY AND ELEMENTARY PHYSICS FOR
VETERINARY STUDENTS.

LECTURES—As for Junior Course.

PRACTICAL—At hours to be arranged.

Elementary Physics.—Weight. Elasticity and pressure. Levers. Pulleys. Metric system of weights and measures. Specific gravity. Air-pump. Barometer. Diffusion of gases and liquids. Heat expansion. Change of state. Freezing. Boiling. Evaporation. Specific heat. Radiant heat.

Inorganic Chemistry.—Mixtures. Compounds. Elements. Laws of combination by weight and volume. Atomic theory. Use of symbols and equations. Chemical classification upon physical and chemical data. Hydrogen. Oxygen. Nitrogen. The halogens. Sulphur. Phosphorus. Carbon. Boron. Silicon. The chief compounds of these elements.

Metals.—The following metals and their most important compounds:—Potassium, sodium, barium, calcium, magnesium, zinc, chromium, iron, silver, copper, tin, lead, mercury, arsenic, antimony, bismuth.

Organic Chemistry.—General principles of ultimate analysis. Determination of molecular weights. Classification. Homologous series. The chief hydrocarbons, including benzene. Alcohols. Ethers. Substitution compounds. Compound ethers (so-called). Phenol. Aldehyde. The chief acids and their salts. The fixed oils and fats. Saponification. The carbohydrates. Fermentation. Cyanogen. Urea.

Alkaloids.—A few of the most important.

AGRICULTURAL CHEMISTRY.

Tuesday and Thursday, 10.30 to 11.30. Commencing 15th October.

The course will consist of 50 lectures, and will comprise:—

History of Agricultural Chemistry.

The Plant.—Composition and analysis. Changes during germination and growth. The essential food materials. Plant poisons.

The Atmosphere.—Composition and impurities. Heat, light, and rainfall. Weather forecasts.

The Soil.—Nature and formation. Chemical composition. Movement of water and air in soils. Classification of soils. Nitrification and the biology of soils. Causes of infertility. Chemical and mechanical analysis of soils.

Manures.—The principles of manuring. Farmyard manure, guano, green manuring, and lime. Origin and manufacture of artificial manures. Fate of manures in the soil. Interpretation of analyses. Mixing manures.

Crops.—Classification and special requirements. Field experiments. Rotation of crops. Composition of crops. Changes during ripening and storage.

Animals.—Composition and nutrition. Foods and their constituents. Digestibility and nutritive value of foods. Relation of food to animal requirements. Mixing, cooking, and spicing foods. Relation of food to manure.

The Dairy.—Composition of milk. Chemical and physical characters of the various constituents. Milk standards. Butter. Cheese.

Antiseptics and Disinfectants.—Dipping, spraying, and pickling agents. Properties and adulterations

Fee for the Course, £1 11s. 6d.

PRACTICAL CLASS.

Tuesday and Thursday, 11.30 to 1.30. Commencing 15th October.

The work of this class will be mainly quantitative. Students will conduct separate analyses of manures, feeding stuffs, and dairy products, and gain experience in the testing of soils and drinking waters. Exercises will be set on the interpretation of commercial analyses, and the valuation of agricultural materials.

All Students attending the lectures of the Senior Course are strongly recommended to take this Practical Class.

Fee for the Course (including Apparatus and Chemicals), £3 3s.

LABORATORY.

Practical instruction in agricultural chemistry is given daily from 10 a.m. to 4 p.m. in the Chemical Laboratories. Students are taught the estimation and valuation of the constituents of fertilisers and feeding stuffs, and the detection of adulterations; the analysis of waters, soils, plants, and dairy products; and other subjects of agricultural importance.

| | Full Time. | Half Time. |
|----------------------------------|------------|------------|
| <i>Fees—</i> { <i>One Month,</i> | £2 10s. | £1 10s. |
| { <i>Winter Session,</i> | £13 0s. | £7 0s. |

BOTANY AND AGRICULTURAL BOTANY.

PROFESSOR M'ALPINE.

ASSISTANT—MR. DUNLOP.

JUNIOR COURSE.

Tuesday and Thursday, 10.30 to 11.30 a.m. Commencing 15th October.

This course consists of 50 lectures, and is intended as an introduction to the Senior Course on Agricultural Botany.

A.—STUDY OF TYPICAL PLANTS.

The wallflower (*Cruciferae*).

External construction—Root, shoot, flower, fruit, seed.

Internal structure—Cells, tissues, stem structure, leaf structure, root structure.

Structure of the reproductive organs—Floral envelope, stamens, pistil, fertilization, fruit, seed, germination.

Life history and development.

The lily (*Liliaceae*).

Morphology, physiology, life history.

The spruce (*Coniferae*).

The bracken fern (*Filicineae*).

The field horsetail (*Equisetineae*).

The funaria moss (*Musci*).

Spirogyra and conferva (*Algæ*).

Common brown mould and yeast (*Fungi*).

B.—DESCRIPTION OF PLANTS IN BOTANICAL LANGUAGE.

Modes of life and habitats—Holophytes, insectivores, saprophytes, parasites, symbiotes, mesophytes, xerophytes, hydrophytes.

Vegetative organs—Root, shoot, stem, leaf, bud, thallus.

Reproductive organs—Inflorescence, flower, torus, calyx, corolla, andrœcium, gynœcium, archegonium, antheridium.

Fruit and seed.—Achenes, capsules, schizocarps, nutlets, drupes, berries, aggregates, false-fruits, multiple-fruits.

Plan of description.—Position and direction. Arrangement. Æstivation and ptyxis. Stipulation. Division and branching. Venation. Outline and symmetry. Margins. Base. Apex. Surface—markings, appendages, polish. Texture. Colour. Size. Duration—caducous, deciduous, persistent.

C.—CLASSIFICATION OF PLANTS.

Groups.—Spermatophyta. Angiosperms. Gymnosperms. Pteridophyta. Bryophyta. Thallophyta.

Classes.—Dicotyledon. Monocotyledon. Gymnosperm. Filicineæ. Equisetineæ. Musci. Algæ. Fungi. Lichen. Schizophyta.

Sub-classes of flowering plants.—Polypetalæ. Gamopetalæ. Apetalæ. Petaloideæ. Glumiferae. Spadicifloræ.

Sections of sub-classes.—Hypogynæ. Perigynæ. Epigynæ.

Natural orders.—Cruciferae. Leguminosæ. Umbelliferae. Liliaceæ. Gramineæ. Coniferae.

Fee for the Course, £1 11s. 6d.

SPECIAL PRACTICAL CLASS.

Tuesday and Thursday, 11.30 to 1.30 p.m.

This course of practical instruction ought to be taken with the class on General Botany, and is necessary for the full understanding of the lectures.

Apparatus required for observing plants.

Examination of the typical plants described in the lectures.

Examination of roots, shoots, stems, leaves, buds, flowers, fruits, and seeds.

Description in technical language of the specimens examined.

Determining the class, sub-class, section, and natural order of flowering plants.

Fee for the Course, £3 3s.

SENIOR COURSE.

Monday, Wednesday, and Friday, 10.30 to 11.30 a.m.

Commencing 16th October.

Students attending this course must have previously studied General Botany.

The course will consist of 50 lectures, and will comprise :—

NUTRITION OF GREEN PLANTS.—Carbon assimilation and its bearing on agriculture. Fat formation. Amide formation. Albumin formation. Peculiarities of leguminous plants—the nodules. Mycorrhiza. Assimilation of nitrogen in forms of nitrates, amides, ammonia compounds, and free nitrogen. The condition of soil and its regulation for healthy plant life. Water supply and water absorption. Mineral supply and mineral absorption. Gas supply and gas absorption. Circulation of solids, liquids, and gases in the body of the plant. Transpiration. Water culture—effects of various constituents. Ash—composition and variation. Control of nutrition.

METABOLISM.—Constructive and destructive. Metabolism of nitrogenous and non-nitrogenous compounds. Germination—the part sown; the mechanical, chemical, and developmental changes

involved. Hard, diseased, and dead seeds, and how they are identified. Fatty, fleshy, and starchy seeds. Testing germinating power. Choice of seed dependent upon soil, climate, and object of cultivation. Pickling the seed and spraying the plant. Preservation of seed—rapid test for mouldiness. Precautions when purchasing seed. "Laying" of cereals and formation of fibre in the lower internodes. Ripening of grain, roots, and tubers. Reservoirs of nutrient materials:—parts used and materials stored. Metabolism in stores. Ferments. Food transport. Metabolism in the soil—production of nitrates. Denitrification. Humus, and its influence on root life. Substances in plants not used for nutrition. Respiration of aerial and underground parts. Control of metabolic processes.

DEVELOPMENT OF AGRICULTURAL PLANTS.—Growth and its external conditions. Brairding. Tillering. Tufted and creeping habits of growth. Tuber formation. Root depth and distribution of roots in the soil. Grasses, clovers, turnips, potatoes, mangels, etc. Pruning—natural and artificial. Propagation. Tubers. Rhizomes. Runners. Root stocks. Corms. Bulbs. Cuttings. Grafts. Reproduction of agricultural plants. Fruit and seed formation—influence of soil, locality, and season. Self and cross pollination. Synacmy. Dichogamy—proterandrous, proterogynous. Anemophilous and zooidophilous plants. Mendel's law. Keeping varieties true. Change of seed. Production of new varieties—selection, natural crossing, artificial crossing. Hybrids.

OBJECTS OF CULTIVATION.—Food production—starch, sugar, fat, albumin, fodder, pasture, vegetables, fruits, seeds. Drink production—coffee, tea, hop. Clothing—fibre, straw, cotton. Tanning material. Dye stuffs. Drugs. Resins. Gums. Latex. Timber. Hedges, etc. The parts used.

CLASSIFICATION.—Life history of cultivated plants—oat, perennial ryegrass, turnip, bean, potato, mangel, etc. Classes of fungi, Life history of disease-producing fungi—Phytophthora, Puccinia, Tilletia, Ustilago, Claviceps, Plasmodiophora. Life history of saprophytes—Agaricus campestris, etc. Life history of soil bacteria.

NATURAL ORDERS.—The species of cultivated plants, weeds, and poisonous plants belonging to the following natural orders to be specially considered:—Ranunculaceæ, papaveraceæ, cruciferae, fumariaceæ, violaceæ, caryophyllaceæ, geraniaceæ, linaceæ, hypericaceæ, rosaceæ, leguminosæ, umbelliferae, ericaceæ, primulaceæ, plantaginaceæ, solanaceæ, convolvulaceæ, orobanchaceæ, boraginaceæ, scrophulariaceæ, labiatae, cucurbitaceæ, rubiaceæ, compositæ, chenopodiaceæ, urticaceæ, cannabaceæ, euphorbiaceæ, liliaceæ, juncaceæ, amaryllidaceæ, iridaceæ, orchidaceæ, graminaceæ, cyperaceæ, coniferae, taxaceæ, filicineæ, equisetineæ. List of cultivated plants, weeds, and poisonous plants belonging to above orders.

GRASS MIXTURES.—Composition. Principles according to which they are compounded. Examples of mixtures for various purposes.

Fee for the Course, £1 11s. 6d.

PRACTICAL AGRICULTURAL BOTANY.

*Monday, Wednesday, and Friday, 11.30 to 1.30 p.m.**Commencing 16th October.*

- Filling up schedules for flowers from models and specimens. Describing roots, stems, and leaves from specimens.
- Identification of plants from the flora. Grasses identified by leaf and ear. Cultivated plants and their varieties. Poisonous plants. Weeds.
- Examination and identification of fruits and seeds. Grass seeds and common impurities therein. Clover seeds. Mangel and turnip seeds, etc. Making up a standard set of seeds. Analysing seed mixtures.
- Determination of purity and germinating power of agricultural seeds by slow and rapid tests.
- Micro-chemical testing. Cellulose. Lignin. Cork. Starch. Sugar. Fat. Amide. Albumin.
- Microscopic examination of cultivated plants.
- Examination of parasitic fungi.—Potato disease. Mildews. Rusts. Smuts. Bunts. Ergot. Finger-and-toe, etc.

Fee for the Course, £3 3s.

INTRODUCTION TO GENERAL BOTANY.

Course of 50 Lectures and Demonstrations, commencing 15th October.

*Monday and Thursday, 3 to 4 p.m.**

- I. Distinctions between animals and plants. Powers of plants in general. Peculiar powers.
- II. The vegetative parts of the plant body—their various functions and modifications, etc. Roots, stems, leaves, buds.
- III. The reproductive parts of the plant. Inflorescences, flowers, fruits, seeds. The process of fertilization, its conditions and its results.
- IV. Classification of flowering plants. Phanerogams, and their distinctions from cryptogams. Angiosperms and gymnosperms. Monocotyledons and dicotyledons.
- V. Natural Orders. Ranunculaceæ, cruciferae, papaveraceæ, rosaceæ, leguminosæ, umbelliferae, scrophulariaceæ, solanaceæ, compositæ, graminaceæ, cyperaceæ, coniferae.
- VI. Special histology, physiology, and modes of life. Structure of a typical vegetable cell. Peculiarity of the fungus cell. Carbon assimilation. Absorption by root and leaf. Circulation of crude and elaborated sap. Transpiration. Germination. Structure of root, stem, and leaf. The cambium and thickening of root and stem.

Fee for the Course, £1 11s. 6d.

* On and after 25th March, the hour is subject to alteration as may be arranged.

FORESTRY.

MR. NISBET.

*Monday, Wednesday, and Friday, 4 to 5 p.m.,
with Excursions and Practical Demonstrations fortnightly on
alternate Saturdays.*

Commencing 16th October.

The course for the B.Sc. degree, for the College Certificate, and for the Highland Society's examinations consists of 60 lectures on the following subjects, with excursions and practical demonstrations fortnightly on alternate Saturdays:—

A.—*On Mondays throughout session (20 Lectures):—*

I. INTRODUCTORY (5 Lectures).

1. Historical sketch of British Forestry, past and present. Recommendations of Forestry Committees in 1887, 1902, 1907, and 1908, and steps taken thereafter.

2. Influence of forests on climate, soil-moisture, water-storage, and town water-supply, agriculture, and other national industries.

3. British forest trees, indigenous and naturalised, and the different forms and characteristics of British woodland crops—simple coppice and coppice with standards (*silva caedua*), and highwood (*salvus*). The legal status of underwoods and of timber with regard to rating, valuation for estate and succession duty, and rights of use by life-tenants under entail.

4. The general and the specific habits of growth of coppices and underwoods, standards in copse, and high-timber crops.

5. The main roots and branches of our knowledge concerning the cultivation of the soil. The scientific foundations of modern forestry, and its principles.

II. SYLVICULTURE (15 Lectures).

1. *The Physiology, Nutrition, and Growth of Forest Trees*, and their various requirements as to temperature, mineral food, soil-moisture, light, and individual growing-space. Soil, climate, aspect, and environment in regard to tree-growth and woodland cultivation. The general characteristics and the special peculiarities of the different kinds of British woodland trees, and their power of adapting themselves to variations from their natural habitat and normal environment. Sporadic and gregarious habits among forest trees; pure and mixed woods, and their comparative advantages and drawbacks.

2. *The Formation of Woodlands*.—Selection of timber-crops with regard to soil, climate, aspect, elevation, and local or prospective demand for wood—

(a) *Soil-Preparation*. Draining, clearing, enclosing, and preparing land for planting.

(b) *Plant Nurseries*. Temporary and permanent nurseries. Selection of site; laying out and preparing a permanent nursery. Collection, storage, and sowing of the different kinds of tree-seeds. Management of seed-beds and transplant-lines. Pruning and transplanting. Packing and transport of seedlings and transplants. Nursery implements. Manuring of Nurseries. Chief nursery pests, and their extermination. Cost of nursery plants and of nursery work generally.

(c) *Planting*. Notching or slit-planting, pit-planting, ball-planting, mound-planting. Implements used in planting. Best season for planting (according to soil, climate, and locality), and best method to adopt for given kinds of land. The actual work of planting, and its average cost. Planting on waste lands, turf-bogs, and rough hill pastures; sea-coast planting and shelter-belts; planting on sand-dunes and over moorpan.

3. *The Tending of Woodlands*.—Filling blanks in young plantations, weeding, and cleaning. The theory and the practice of thinning young woods and pole-crops, and the effects (immediate and prospective) of insufficient and of excessive thinning. The pruning of standards in copsewoods. Heavy thinnings or partial clearances in older woods (with or without underplanting) to stimulate increment, hasten maturity, and promote seed-bearing. Applicability of continental methods to British conditions.

4. *The Renewal of Woodlands*—

(a) *Simple Coppices* and their improvement by layering and planting. Oak, ash, chestnut, hazel, and mixed coppices; osier-holts and basket-willow cultivation.

(b) *Stored Coppices, Copsewoods, or Coppice with Standards*, and the improvement of their timber by interplanting, or their conversion into high-woods by groving. The renewal and replacement of standard trees.

(c) *Highwoods*. Comparative advantages and drawbacks of natural regeneration by self-sown seed and of artificial renewal by sowing or planting. British and Continental methods of regenerating and renewing mature woods of oak, beech, Scots pine, and other timber trees. Applicability of Continental system (of preparatory falls, seeding falls, and gradual clearance) to British conditions. Soil-preparation for natural regeneration, sowing, or planting. Comparative advantages and drawbacks of sowing and of planting in Britain. The usual methods and the average cost of planting in the renewal of British woodlands. The question of crop-rotation in timber-growing.

5. *Arboricultural Methods*.—The principles of arboreal landscape-gardening; harmony and contrast in outline and foliage effects. Deviation from sylvicultural principles to procure arboricultural effect. Transplanting of large trees. Planting of groves, avenues, ornamental underwoods, and coverts for game. Stimulating the vigour and prolonging the life of old ornamental trees. Pruning and tending of hedges. Hedgerows and field-timber. Trees in parks and towns.

B.—*On Wednesdays throughout session (20 Lectures)*.—

III. THE MEASUREMENT OF TIMBER AND THE VALUATION OF TIMBER CROPS (8 Lectures).

1. *Measurement* of logs, standing trees, and growing crops of timber, and of the annual and periodic increment throughout woodlands.

2. *Valuation* of standing trees and of growing crops of timber. Actuarial methods as applied to forestry.

IV. UTILISATION OF WOODLAND PRODUCE (12 Lectures).

1. *Wood and Timber*.—Anatomical structure and chemical composition of wood. Appearance, technical properties, chief industrial uses, and present market-value of the different kinds of British timber. Flaws and defects. Classification and standardising of hewn and of converted timber.

2. *Felling, Preparing, and Disposal of Timber and other Woodland Produce*.—Small coppice-wood, hurdle-making, tanning-bark, osiers, tree-seeds, &c. Classification and standardising of round and of hewn timber.

3. *Timber-Transport by Land and Water*.—British methods of extracting, hauling, carting, and of canal, river, and railway transport; cheapening of extraction and of transport by road-making and improved management. Continental methods of extraction, and of transport by land (sledging, timber-slides, rope-slides, tramways, and forest railroads), and by water (loose drifting, and floating in rafts), and the extent to which similar methods can be profitably applied in British woodlands.

4. *Seasoning and Preservation of Timber*.—Natural seasoning, and artificial methods. Chief methods of impregnation, and comparative cost and technical value of same.

5. *Woodland Industries*.—The construction and working of small woodland and estate sawmills (water-power and steam-power). Classification and standardisation of converted timber. Use of sawmill refuse for making wood-wool, briquettes, &c. Preparation of wood pulp and cellulose. Charcoal-burning, and the dry distillation of wood. Resin-tapping, and the distillation of turpentine. Potash-burning. Grazing in woodlands. Woodland sport.

C.—On Fridays throughout session (20 Lectures).—

V. THE MANAGEMENT OF WOODLANDS (10 Lectures).

1. *Theoretical Principles* with regard to the economic management of woodlands, to the normal distribution of capital between the land and the growing timber-crops, and to the proper apportionment of the latter in regular and normal age-classes.

2. *Practical Application of these Theoretical Principles*.—

(a) *British Methods* adopted in the past for simple coppices, coppice with standards, and highwoods.

(b) *Brief Description of the chief Continental Methods*, and their applicability in whole or in part to British conditions. Formation of working-circles, blocks, and compartments. Planning a convenient network of woodland roads and paths. Fixing what seems to be the most profitable rotation. Determining and allocating the annual falls.

3. *Working Plans or Schemas of Management*.—Description of the more regular methods now being gradually introduced, with special study of concrete cases of recent working-plans already published for Scotland (Raith, Novar, Ardross) and for England (Forest of Dean, Highmeadow and Tintern Woods, Blackmoor, Alice Holt).

4. *Bookkeeping for Foresters*.—Cash, labour, timber, and sawmill accounts. Daily, weekly, and monthly returns. Annual financial statements—actual income and expenditure for past year, revised estimate for present year, and forecast for next year.

VI. PROTECTION OF WOODLANDS (10 Lectures).

1. *Legal and other Protection against Human Acts*.—Commonage and other rights, trespass, waste, malicious injury, theft, incendiarism, and fires arising from other causes.

2. *Farm-Stock, Game, and Vermin*.—Nature of damage by the different kinds of animals, and best means of prevention (including enclosure) and of remedy. Sport in woodlands.

3. *Birds in relation to Woodlands*.—The useful and the harmful kinds.

4. *Injurious Insects*.—Nature of damage. Description of the chief insects causing serious injury in British woodlands and among ornamental trees, and of the practical means of preventing attacks and of remedying injuries committed. Predatory insects useful to the forester.

5. *Weeds, Epiphytic and Parasitic Plants, and Fungous Diseases of Forest Trees*.—The general nature, growth, mode of attack, and development of fungi. Description of the chief fungous diseases causing serious injury in British woodlands and among ornamental trees, and of the practical means for preventing their occurrence and increase.

6. *Damage arising from Inorganic Causes*, such as non-parasitic diseases, water-logging, wind, frost, hail, drought, sun-burn, fire, lightning, factory and town smoke, senile decay, &c.

Fee for the Course, £3 3s.

AGRICULTURAL ZOOLOGY.

MR. KING.

COURSE OF FORTY LECTURES AND DEMONSTRATIONS.

Tuesday and Thursday, 4.30 to 5.30 p.m. Commencing 15th October.

A general study of Zoology will be taken up, especial attention being devoted to those animals bearing directly or indirectly upon agriculture, the various sub-kingdoms being compared, as—

Protozoa.—Animals composed of one cell.

Cœlenterata.—Zoophytes.

Echinodermata.—Animals having hedgehog-like skin.

Mollusca.—Mollusca, snails, slugs, &c.

Vermes.—Segmented worms, eelworms, tapeworms, flukes, &c.

Arthropoda.—Insects, mites, ticks, plant-mites=red spider.

Vertebrata.—Mammals, birds, reptiles, amphibians, fishes.

The life histories of various species of arthropoda will be studied, among which may be mentioned the following :—

Forms injurious to farm crops—Their character and identification.
Methods of prevention and treatment.

(a) Cereal Crops—wheat, oats, etc.—Wire worm. Click or Elater beetles. Wheat midge. Hessian fly. Grub (“Daddy long-legs”).

(b) Leguminous Crops—beans, peas, etc.—Bean aphid. Pea aphid. Weevils, etc. Clover sickness (eelworms).

(c) Roots and other Crops.—Turnip fly or flea beetle. Turnip aphid. Turnip-leaf miner. Carrot fly, etc.

Forms injurious to farm stock—

(a) Sheep.—The sheep botfly. The sheep maggotfly. Ticks. Keds, etc.

(b) Oxen.—The ox bot. The ox warble. The gadfly, etc.

(c) Horses.—Gadflies, etc.

(d) Dogs.—The dog tick.

(e) Various internal parasites.

Forms injurious to fruit crops—

(a) Apples and Pears.—American blight or woolly aphid, etc.

(b) Gooseberries and Currants.—Sawflies, etc.

(c) Strawberries.—Strawberry moth, etc.

FOREST ENTOMOLOGY.

General character of insects that affect forests. Certain insects beneficial to forests. Insects injurious to forest trees: their life history and how to deal with the attacks.

(a) Wood-boring in timber—destroying insects.

(b) Leaf destroyers.

(c) Bud destroyers.

(d) Seed destroyers.

(e) Root destroyers.

(f) Producers of deformation and malformation, etc.

Fee for the Course, £1 11s. 6d.

VETERINARY SCIENCE.

PRINCIPAL M'CALL AND PROFESSOR JOHN R. M'CALL.

Mondays, Wednesdays, and Fridays before Christmas; Mondays and Fridays after Christmas, 4.30 to 6 p.m. Commencing 16th October.

COURSE OF FIFTY LECTURES, WITH
DEMONSTRATIONS.

Anatomy and Physiology.—Including the comparative anatomy of the bones of the animals of the farm, and the structure and functions of the different organs and tissues of the horse, ox, sheep, and pig.

The digestive processes and principles of nutrition in the above animals. A general knowledge of the blood and its circulation, and the processes of respiration, secretion, and excretion.

The physiology of reproduction, and its bearings on healthy breeding.

The period of gestation in the mare, cow, ewe, and sow, and the special management of these animals prior to, at the time of, and after parturition.

The management of farm stock in health and disease.

Veterinary hygiene and dietetics, including feeding and general management of animals, and the construction and ventilation of stables and byres.

A few of the most common ailments and lamenesses affecting farm stock, and their prevention and eradication.

And, as far as time permits, the following diseases:—Anthrax, tuberculosis, colic, milk fever, swine fever, glanders, common lamenesses in horses, shoeing and care of feet. Parasitic diseases of farm stock.

In addition to the lectures, demonstrations on live animals will be given at times to be fixed during the session.

Fee for the Course, £3 3s.

AGRICULTURAL ENGINEERING.

MR. BAMFORD.

Lectures—Monday, Tuesday, Wednesday, and Friday, 3.15 to 4.15 p.m. Commencing 16th October.

(The class on Tuesday will be held during the first half of the session only.)

Practical Class—Third Saturday of each month, from October to March, 10.15 a.m. to 1.15 p.m.

The Course will consist of 70 Lectures, with demonstrations and practical work.

The Lectures will embrace the following subjects :—

Mechanics.—Units of time and distance; measurement of velocity and acceleration. Mass, density, force. Laws of Motion. Moment of force. Centre of gravity, and its position in simple cases. Levers; the steelyard. Work, energy, power, momentum. Communication of power by shafting, pulleys, wheels, couplings, clutches. Belt, rope, and chain driving. Strength and elasticity of materials. Stress-strain diagrams. Resistance to elongation, compression, bending, and torsion. Friction and lubrication of surfaces. Fluids, Definition of fluid and liquid. Air: properties, elasticity, specific heat. Barometer. Moisture. Winds. Windmills. Water: composition and weight. Flow of water. Friction of water in pipes and channels. Usual speed of flow. Water-wheels, turbines, water-pressure engines, pumps. Sources of water supply, means of purification and storage.

Heat.—Distinction between heat and temperature. Thermometer; different thermometric scales; absolute zero. Unit of heat; specific heat; latent heat; total heat. Conduction, convection, and radiation of heat. First law of thermodynamics. Mechanical equivalent of heat. Principle of combustion. Calorific value of fuels. Modes of transforming heat of combustion into power, as in the steam engine and gas and oil engines.

Boilers.—Construction and setting of an ordinary portable engine boiler and of a Cornish boiler. Safety valves, and other fittings. Grate and heating surfaces.

Steam Engines.—Construction of the stationary and portable steam engine. Expansive working. Single cylinder and compound. Indicators and diagrams. Indicated horse-power. Effective, or brake horse-power. Consumption of steam and fuel per horse-power. Valves, valve gears, governors, fly wheels, and other details.

Gas and Oil Engines.—Principle of action. Admission, lighting, and exhaust valves. Valve gear and governor. Lubrication. Cooling water-jacket. Fuel and water required per horse-power.

Electrical Generators, Motors, and Conductors.—Fundamental principles of dynamo machines. Field magnets. Armatures. Efficiency and energy losses in dynamo machines. Detection of faults. Regulation of shunt and series motors. Use of fuses and cut-outs. Horse-power of motors, and calculation of watts to be delivered at terminals. Ohm's law. Losses in conductors, and calculation of sizes to convey given currents with definite losses. Jointing and insulation of conductors.

Agricultural Implements.—Construction, mode of action, and the general principles involved in the construction of farm implements. The adjustments of implements for different descriptions of work. Lubrication. Working or wearing parts. Cultivating implements worked by steam power. Horse cultivating implements—ploughs, cultivators or grubbers, harrows, rollers, scrubbers, &c. Sowing implements—drills, manure and water drills, broadcast harrows, broadcasters, manure distributors, potato planters. Hoeing implements. Implements used for (a) Securing of crops—reaping machines, mowing machines, haymakers, horse-rakes, potato-raisers, &c.; (b) Preparing crops for market—threshing machines, winnowing machines, corn screens, hummellers, &c.; (c) Preparing foods—mills, chaff-cutters, pulpers, turnip-cutters, cake-breakers, cooking apparatus. Dairy appliances—cream separators, churns, butter workers, cheese tubs, curd mills, cheese presses, &c. Carts, waggons, sleighs, rick-lifters. Drainage instruments. Lime kilns. Arrangements of shafting, pulleys, clutches, &c., for farm machinery at homesteads.

The Practical Class will be held in the Engineering Laboratory, Holmes Farm, Kilmarnock, and the laboratory will be equipped with various agricultural implements, a dynamo, an electrical motor, a wire-testing machine, and other apparatus for purposes of demonstration and practical work.

Fee for the Course, £2 2s.

GEOLOGY.

MR. ———

*Monday, Wednesday, and Friday, 3.30 to 4.30 p.m. Commencing
Friday, 16th October.*

This Course consists of 60 Lectures and 60 hours' practical work, and will embrace the following subjects:—

Introductory sketch; chrysallography; chief rock-forming minerals—their physical and optical characters; classifications of rocks; rock structures, including stratification, cleavage, faults, dip, strike, unconformity, overlap, &c.

Rocks in relation to soil formation: agencies at work—constructive and destructive; geological formations of Great Britain—their characters, divisions, and order of deposition; the most important fossils by which they are distinguished; relation of strata to configuration, springs, artesian wells, water supply, drainage, &c.

The sources, characters, modes of occurrence and distribution of manures; building and road-making materials; the distribution of plants, animals, human settlements, industries, and disease as dependent on geological conditions.

PRACTICAL CLASS.

Monday, Wednesday, and Friday, 4.30 to 5.30 p.m.

This Course will comprise 60 meetings, and deal with—chief crystal forms; identification of the more important minerals; microscopic work; chief types of the various classes of rocks; characteristic fossils; geological maps, sections, &c.

Fee for the Course, £3 3s.

Evening Classes.

AGRICULTURE.

PROFESSOR WRIGHT AND MR. M'CUTCHEON.

JUNIOR COURSE OF TWENTY LECTURES.

Wednesday, 6.45 to 7.45 p.m.

Introductory Lecture on Wednesday evening, 14th October, at 8 o'clock. Admission free.

The subjects of Lectures will be :—

Soils.—Their origin, variation, formation, properties, and classification.

Cultivation of soils. Functions of tillage. Conditions and indications of fertility.

Plant Life.—What a plant is, and how it grows. Maturation.

Crops.—Cereal crops. Root and forage crops. Principles of cultivation. Rotations.

Pasture Plants and their cultivation.

Implements and machines.

Farm Live Stock.—Chief breeds of horses, cattle, sheep, and pigs.

This course is chiefly intended as a popular introduction to the more complete course of instruction given in the senior classes.

Five bursaries of the value of £5 each are offered for competition to the students attending this class.

Fee for the Session, 10s. 6d.

SENIOR COURSE OF FORTY LECTURES.

PROFESSOR WRIGHT and MR. BROWN.

Tuesday, 6.45 to 8.45 p.m.

Introductory Lecture on Wednesday evening, 14th October, at 8 o'clock.

The Lectures will embrace the following subjects:—

Weeds and Parasitic Plants.—The most troublesome weeds. Methods of prevention and eradication.

Manures.—Manurial treatment of each of the farm crops. Irrigation. Liquid manuring. Sewage.

Pastures.—Natural and artificial grasses and clovers. Formation of permanent and temporary pastures. Haymaking. Ensilage.

Live Stock of the Farm.—Breeds of horses, cattle, sheep, and pigs. Points of breeds. Selection. Laws of breeding.

Management of all kinds of live stock from birth to maturity. Diets for milch stock, fattening cattle, sheep, and horses.

This class is held for the benefit of students who are unable to attend the day class in Agriculture, in order that they may be enabled to obtain the same instruction by attendance on the evening class for two successive sessions, in which different parts of the subject will be treated. Attendance on this class for two successive sessions will qualify for the examinations of the Surveyors' Institute and for the National Diploma in Agriculture.

Fee for the Session, £1 11s. 6d.

PRACTICAL FIELD WORK.

Excursions to farms on Saturdays are arranged to suit the convenience of students of all the classes of Agriculture.

DAIRYING.

MR. STEVENSON.

COURSE OF TWENTY LECTURES.

Thursday, 7.45 to 8.45 p.m. Commencing 15th October.

The Dairy Farm.—Situation. Soil. Shelter. Water supply. Rotations of crops. Pasture. Exhaustion of soil. Buildings.

The Dairy Cow.—Characteristics. Comparison of dairy breeds. General management. Rearing, selecting, drafting. Feeding. Composition and comparative values of food stuffs. Summer and winter rations. Balancing the ration. Preparation of foods.

Milk.—Nature and composition. Properties of the various constituents. Variation in composition. Government standard. Causes of variation. Properties of milk. Liability to undergo fermentation. Bacteria. Milk as a medium for bacteria. Bacteria commonly found in milk. Control of bacterial growth in milk and milk products. Importance of cleanliness. Cooling. Pasteurising. Sterilising. Use of starters. Milk testing. The creamometer. The Babcock test. The Gerber test. The lactometer. The Westphal balance.

Disposal of Milk.—Selling new milk—To towns, to factories. Treatment. Butter-making. Equipment of dairy. Methods of creaming. Centrifugal separators. Preparation of cream for churning. The effects of ripening. Testing acidity in cream. Acidimeter. Churning. Circumstances affecting the flavour, aroma, texture, grain, colour, and keeping properties. Preserving of butter. Common defects in butter. Butter ratio. Cheese-making—appliances. Principles of manufacture of hard and soft cheese. Agents employed. Rennet and coagulation. Solids involved. Annatto.

Salt. Starters. Preparation of the milk. Importance of acidity. Tests for acidity. Effects of temperature. Control of fermentation in milk and curd. Ripening of cheese. Cheese ratio. By-products of milk.

* *Bacon-Curing*.—Bacon-curing by salting. Cutting of carcasses. Profitable and unprofitable carcasses. Rolled bacon. Fletch bacon. Curing hams. Fancy methods of curing, Spicing, &c. Pickling bacon. Smoking hams and bacon. Construction of smoke-room. Storing. Packing for hot climate. Utilisation of offal, &c.

Fee for the Course, £1 11s. 6d.

* The Lectures on Bacon-curing will be given by Mr. Thomas H. Steven.

BACTERIOLOGY.

DR. R. M. BUCHANAN.

Thursday, 6.45 to 7.45 p.m. Commencing 15th October.

The Course will extend to 10 meetings, and will comprise Lectures, Demonstrations, and Laboratory Work.

Introduction.—Discovery of bacteria. Development of bacteriology. Relation of bacteria to other living beings.

Morphology.—Form, size, and structure. Vegetative and spore forms. Classification.

Biology.—Conditions of growth. Reproduction—multiplication by fission and germination from spores. Motility. Heat, light, and colour production. Chemical effects. Production of disease. Saprophytes and parasites.

Methods of Bacteriological Study and Research.—Microscopical examination. Staining. Cultivation on artificial media. Sterilisation of media and apparatus. Biological experiments. Application of pure cultures to economic purposes.

Bacteria in the Soil.—Functions. Dentrification and Nitrification. Symbiosis. Diseases related to the soil—Quarter-evil, malignant oedema, braxy, louping-ill, tetanus, and anthrax.

Bacteria in Air, Water, and Sewage.—Dust and air pollution. Effects of drying and moisture. Influence of gravity. Ordinary water bacteria. Sewage bacteria and their value as evidence of pollution.

Bacteria in milk and milk products.—Sources and numbers. Influence of time and temperature. Lactic, butyric, and peptogenic fermentations. Milk-borne disease—Tuberculosis, scarlet fever, diphtheria, sore throat, enteric fever, cholera, and diarrhoea.

Measures for preventing or staying the growth or destroying the life of Bacteria.—Cleanliness. Refrigeration. Antiseptics. Pasteurisation. Sterilisation. Disinfectants.

Fee for the Session, 10s. 6d.

AGRICULTURAL CHEMISTRY.

PROFESSOR BERRY.

ASSISTANT—MR. GREEN.

INTERMEDIATE CHEMISTRY.

JUNIOR COURSE OF TWENTY LECTURES.

Wednesday, 7.45 to 8.45 p.m. Commencing 21st October.

This course is intended as a preparation for a more advanced course in General Chemistry or Agricultural Chemistry. It will be devoted to the explanation of the fundamental facts and principles of chemistry, and the consideration of the elements and compounds of greatest importance in agricultural chemistry. The chief classes of carbon compounds will be shortly dealt with, and typical and important examples more fully studied. The lectures will be fully illustrated with experiments. The meaning and use of chemical nomenclature will be fully explained, and exercises will be set in chemical calculations.

Fee, 10s. 6d.

Students taking this class along with Junior Agriculture are admitted at a special fee of 12s. 6d. for the two classes.

SENIOR COURSE.

Thursday, 6.45 to 8.45 p.m. Commencing 15th October.

This course will consist of 40 lectures, and will deal in more popular terms with the subjects detailed in the Syllabus of the Senior Day Class, page 53. Special attention will be devoted to the commercial and practical aspects of Agricultural Chemistry. Manures and feeding stuffs—their composition, designation, valuation, purchase, and handling—will receive special attention.

Fee, £1 11s. 6d.

BOTANY AND AGRICULTURAL BOTANY.

PROFESSOR M'ALPINE.

JUNIOR COURSE OF TWENTY LECTURES.

Tuesday, 6.45 to 7.45 p.m. Commencing 20th October.

Distinctions between animals and plants. Powers of plants in general. Peculiar powers.

The vegetative parts of the plant body—their various functions and modifications, etc. Roots, stems, leaves, buds.

The reproductive parts of the plant. Inflorescences, flowers, fruits, seeds. The process of fertilization, its conditions and its results.

Classification of flowering plants. Phanerogams, and their distinctions from cryptogams. Angiosperms and gymnosperms. Monocotyledons and dicotyledons.

Natural Orders. Ranunculaceæ, cruciferæ, rosaceæ, leguminosæ, solanaceæ, compositæ, graminaceæ, cyperaceæ.

Special histology, physiology, and modes of life. Structure of a typical vegetable cell. Peculiarity of the fungus cell. Carbon assimilation. Absorption by root and leaf. Circulation of crude and elaborated sap. Transpiration. Germination. Structure of root, stem, and leaf. The cambium and thickening of root and stem.

Fee, 10s. 6d.

SENIOR COURSE OF FORTY LECTURES.

Thursday, 6.45 to 8.45 p.m. Commencing 22nd October.

NUTRITION OF PLANTS.—Carbon assimilation. Albuminoid formation. The root tubercles of Leguminosæ. Nitrates and ammonia compounds. Plant ash. Gases. Water absorption. Water circulation. Mineral absorption.

METABOLISM.—Metabolism of nitrogenous and of non-nitrogenous compounds. Germination. Ripening. Reservoirs of nutrient materials. Substances not used for nutrition. Respiration.

REPRODUCTION.—Fertilization of the egg and development of the embryo. Self and cross pollination. Synacmy. Dichogamy—proterandrous or proterogynous. Anemophilous and zooidophilous flowers. Mendel's law. Hybrids. Varieties.

CLASSIFICATION, ETC.—Life history of seed-producing plants.—Perennial ryegrass. Turnip. Bean. Potato. Mangel, etc. Life history of fungi.—Mycelium. Buds. Spores. Fruit. Mushroom. Ergot. Bunt and Smut. Rust. Potato disease. Club root. Life history of germs.—Nitrification.

POISONOUS PLANTS.—Poisonous parts. Influence of light, heat, season, and food. Coniferæ (yew, savin). Gramineæ (Darnel). Ranunculaceæ (buttercups, aconite, stavesacre). Cruciferæ (charlock). Leguminosæ (laburnum). Umbelliferæ (fool's parsley, hemlock, water hemlock, water dropwort, and others).

WEED PLANTS.—Definition of a weed. Description. Modes of destruction. Botanical classification.

CULTIVATED PLANTS.—Parts used, and for what purpose. Botanical description and classification. The following natural orders to be specially considered:—Gramineæ, Leguminosæ, Cruciferæ, Umbelliferæ. Compositæ and Chenopodiaceæ.

GRASS MIXTURES.—Composition. Principles according to which they are compounded. Examples of mixtures for various purposes.

Fee, £1 11s. 6d.

FORESTRY.

MR. NISBET.

PART I.

Monday, 7.15 to 8.15 p.m. Commencing 19th October.

This course consists of 20 lectures, Introduction and Sylviculture. For full particulars, see page 59.

Fee for the Course, 10s. 6d.

PART II.

Friday, 7.15 to 8.15 p.m. Commencing 16th October.

This course consists of 20 lectures on the management and protection of woodlands. For full particulars, see page 62.

Fee for the Course, 10s. 6d.

TIMBERS AND TIMBER-MEASURING.

MR. NISBET.

Wednesday, 7.15 to 8.15 p.m. Commencing 21st October.

The course consists of 20 lectures on the measurement of timber, the valuation of timber crops, and the utilisation of woodland produce. For full particulars, see page 61.

Fee for the Course, 10s. 6d.

The Forestry Classes are held for the benefit of students who are unable to attend the day class in Forestry, in order that they may be enabled to obtain the same instruction by attendance on the evening classes for one, two, or three sessions, as they find most convenient.

PRINCIPLES OF HORTICULTURE.

A. HOSKING.

COURSE OF TWENTY LECTURES.

Tuesday, 7.45 to 8.45 p.m. Commencing 20th October.

Soils—Kinds, nature, and management of.

Manures—Natural and artificial.

The manuring of garden crops.

The rotation of garden crops.

Seeds—How and when to sow.

The classification of vegetable crops.

The cultivation of vegetables for summer use.

The cultivation of vegetables for autumn and winter use.

The cultivation of vegetables for spring use.

The cultivation of apples, pears, and stone fruits.

The cultivation of gooseberries, currants, &c.

The classification of garden flowers.

The cultivation of hardy flowers—Annuals, biennials, perennials, and shrubs.

The cultivation of florists' flowers—Roses, carnations, &c.

Window gardening—Inside and outside.

The propagation of plants by seeds, cuttings, layers, budding, and grafting.

Insect pests of the vegetable garden.

Insect pests of the fruit garden.

Some common diseases of vegetable crops.

Some common diseases of fruit trees.

Fee for the Course, 10s. 6d.

ESTATE AND FARM BOOK-KEEPING.

MR. ROBB.

COURSE OF TWENTY LECTURES.

Monday, 6.45 to 8.45 p.m. Commencing 19th October.

- I.—The course will be devoted to an exposition of the general principles of book-keeping and bank business. Description and use of books. Cash book, journal, ledger and bank book, cheques and bills of exchange.
- II.—The various books that a farmer should keep, their nature and use. Balancing the cash book. Posting, balancing, and closing the ledger. Making up of a profit and loss account. Valuation and balance sheet. Papers similar to those set for the National Diploma in Agriculture, with others taken from actual farming transactions, will be given and worked out in full by the class.
- III.—The various books that are generally kept by the estate agent, their nature and use. Preparation of rentals. Receipt forms and pay sheets. Collecting house and farm rents, feu-duties, and wayleaves. Property and income tax. Preparing and making up yearly estate accounts of charge and discharge for audit. Papers similar to those set by the Surveyors' Institution, with others taken from actual estate management, will be given and will also be worked out in full by the class.

Fee, £1 1s.

SURVEYING.

MR. R. HENDERSON.

Friday, 6.25 to 7.25 p.m. Commencing 16th October.

The course will consist of twenty lectures, and fifteen field lessons to be given on Saturdays.

The ordinary rules for the measurement of plane surfaces; and of solid bodies.

The use of the surveying chain. The use of scales. Plotting the areas measured, to scale; and the computation thereof.

The use of the level; and how to keep the field book. Preparing sections from the same; and calculating therefrom the cubic contents of soil to be excavated and embanking to be made up as along the line of some proposed new road. Contouring.

The use of the theodolite; and the principles of trigonometrical surveying. Practice with some of the other instruments used by surveyors.

The computation of areas, and the practical application of the contour lines, from the data afforded by the various Ordnance Survey sheets.

Fee, £1 1s.

AGRICULTURAL LAW.

MR. DAVID BRUCE, LL.B.

Wednesday, 6.45 to 7.45 p.m. Commencing 21st October.

The course is designed to meet the requirements of (1) land agents, valuers, and farmers who wish to acquire knowledge of direct value in their practical work ; (2) students preparing for the examinations of the Surveyors' Institution ; (3) students preparing for the National Diploma in Agriculture, and others who wish to acquire a working knowledge of the elements of law relating to leases, valuations, the Agricultural Holdings Acts, &c.

The course consists of forty lectures, arranged in two sections, which will be taken up in alternate winters. Attendance at the class for two successive sessions thus covers the whole course.

I.—SESSION 1908-9.

The first section, to be taken up during Session 1908-9, will treat of the following subjects :—

Land Ownership.—Subjects of ownership, fixtures, trespass, roads, compulsory taking of land, negligence in the use of property, servitudes, water rights, support, common property, fences and mutual gables, life rent and fee.

II.—SESSION 1909-10.

The second section, to be taken up during session 1909-10, will treat of the following subjects :—

Land Occupancy, &c.—Leases, Agricultural Holdings Acts, arbitration, the game laws, law relating to animals, Diseases of Animals Acts, public health, Sale of Food and Drugs Acts, public burdens and taxation, master and servant.

The syllabus is subject to alteration.

Fee for the Session, 10s. 6d.

FOUR WEEKS' COURSE FOR FARMERS.

A special Four Weeks' Course for Farmers will be held in Glasgow in January, 1909. For full particulars see pp. 96-100.



DAIRY SCHOOL

[To face page 76.]

SUMMER SESSION, 1909.

COURSES OF INSTRUCTION IN DAIRYING.

The College Courses at Glasgow and Kilmarnock are arranged to meet the varied requirements of all classes of students in the Theory and Practice of Dairying. Practical Instruction and Lectures are given in the Dairy School, Kilmarnock, during the summer session and for four weeks during the winter session. The Lectures in College are delivered in Glasgow during the winter session.

ENROLMENTS.

Students must make application to the Secretary, National Bank Buildings, Kilmarnock, for admission to the Special Classes two weeks before the date of commencing.

MILKING.

No certificate will be issued to any student who is not an efficient milker. As the present facilities for learning to milk are limited, students are advised to practise before coming to the Dairy School.

A preliminary examination in milking is held at the beginning of each course, and students who fail to pass this examination are required to attend for practice morning or evening, as may be arranged.

PRACTICAL WORK.

All students must take part in the actual work of the School, as directed by Mr. Drummond or his assistant.

I.—SHORT TERMS OF PRACTICAL INSTRUCTION.

Dairy pupils are received at the Dairy School, at any time when it is open, for practical instruction in Cheese and Butter-making. Such students will be enrolled for any period during the summer session at Kilmarnock from 23rd March to 25th September. Fee, 1s. per day, or 5s. per week.

II.—CERTIFICATE IN BUTTER-MAKING.

A complete course of instruction of one month's duration, qualifying for the above Certificate, will commence on Monday, 26th April. The course will consist of Classes for Practical and Theoretical Instruction in Butter-making, meeting daily for four weeks. Instruction in the hand-milking of cows will be given to such an extent as may be required.

The syllabuses of the Lectures are the same as those in the corresponding subjects for the Junior Certificate in Dairying. (See pp. 80 to 82.)

1. *Practical*—(a) Each candidate is required to work at Butter-making daily for four weeks, under an Instructress, either forenoon or afternoon, as may be arranged.
2. *Theoretical*—(b) Candidates are also required to attend regularly the following Courses of Lectures and Practical Demonstrations :—

| | |
|-------------------------------------|------------------|
| Dairying (Junior Course), ... | ... 20 Lectures. |
| Practical Lessons in Milk-testing, | 5 |
| Elements of Dairy Book-keeping, ... | 5 Lectures. |
| Fee for the Course—£1 15s. | |

EXAMINATIONS.

At the end of the fourth week of the course a practical examination will be held in Butter-making and Milking, and also written and oral examinations on the subjects of the lectures. No Certificate will be issued to any pupil who is not an efficient milker.

III.—JUNIOR CERTIFICATE IN DAIRYING.

The course will extend over eight weeks, commencing Monday, 29th March.

PRACTICAL.—Candidates are required to attend the Dairy School as follows :—

- (a) For Cheddar Cheese-making, under the instruction of Mr. Drummond, daily during eight weeks.
- (b) For Butter-making, under an Instructress, daily during four weeks.
- (c) For instruction in the Hand-milking of Cows to such an extent as may be required.

THEORETICAL.—Candidates are also required to attend regularly the following Courses of Lectures and Demonstrations :—

| | | |
|------------------------------------|-------------|--------------|
| Dairying (Junior Course),... | ... | 20 Lectures. |
| Practical Lessons in Milk-testing, | 5 | |
| Elements of Dairy Book-keeping, | 5 Lectures. | |
| Elementary Chemistry, | ... | 15 „ |
| Elementary Botany, | ... | 10 „ |

Fee for the Course—£3.

Candidates who have attended corresponding winter classes in the College in Dairying, Elementary Chemistry, Book-keeping, and Elementary Botany are exempted from attendance on the Lectures in these subjects, but must present themselves for all class examinations.

EXAMINATIONS FOR CERTIFICATE.

At the end of the eighth week of the course a practical examination will be held in Milking, Cheddar Cheese-making, and Butter-making, also written and oral examinations on the subjects of the lectures. The scope of the examinations is indicated by the class syllabus in each subject.

SYLLABUS OF CLASSES FOR SUMMER SESSION, 1909.

JUNIOR DAIRYING.

Mr. STEVENSON.

BUTTER-MAKING AND JUNIOR CERTIFICATE COURSES.

Course of 20 Lectures, commencing 26th April.

Milk.—Nature and composition. Properties of the various constituents. Variation in composition. Government standard. Causes of variation. Properties of milk. Liability to undergo fermentation. Causes of fermentation in milk and milk products.

Bacteria.—Definition. Form, size, and structure. Reproduction. Rate of increase. Conditions of growth. Milk as a medium for bacteria. Bacteria commonly found in milk. Useful and injurious bacteria. Milk-borne diseases. Control of bacterial growth in milk and milk products. Importance of cleanliness. Cooling. Pasteurising. Sterilising. Use of starters. The water supply.

Cream.—Composition. Principles of cream separation. Gravity and centrifugal methods. Preparation of cream for churning. The effects of ripening. Testing acidity in cream. The acidimeter.

Butter and Butter-making.—Composition and general properties. Grading of butter. Principles of butter-making. Circumstances affecting the flavour, aroma, texture, grain, colour, and keeping properties. Preserving of butter. Causes of white specks, streakiness, and rancidity. Butter ratio.

Cheese and Cheese-making.—Composition. Principles of manufacture of hard cheese. Agents employed. Rennet and coagulation. Solids involved. Annatto. Salt. Starters. Preparation of the milk. Importance of acidity. Tests for acidity. Effects of temperature. Control of fermentations in milk and curd. Ripening of hard cheese. Common defects in cheese. Discolouration. Cheese ratio.

Dairy Bye-Products.—Composition, uses, and values.

The Dairy Cow.—Characteristics. Comparison of dairy breeds. General management. Foods and feeding. Summer and winter rations.

Dairy Buildings.—Situation. Arrangement. Construction. Ventilation. Lighting. Drainage. Water supply.

Dairy Appliances.—Selection of machinery and utensils. The fitting up of the modern farm dairy.

MILK TESTING.

 Mr. STEVENSON.

BUTTER-MAKING AND JUNIOR CERTIFICATE COURSE.

Course of Five Practical Lessons, commencing 26th April.

Methods of sampling. Composite samples. Appearance of milk under the microscope. The creamometer. The Babcock test. The Gerber test. Preparation for testing. Estimation of the percentage of fat in—(1) ordinary milk, (2) composite samples of milk, (3) milk samples taken at different stages of milking, (4) cream, (5) skim milk, (6) separated milk, (7) buttermilk, (8) whey. The lactometer. The Westphal balance. Determination of specific gravity. Corrections for temperature. Calculation of total solids and non-fatty solids from the specific gravity and percentage of fat.

 DAIRY BOOK-KEEPING.

 Mr. ROBB.

BUTTER-MAKING AND JUNIOR CERTIFICATE COURSES.

Junior Course of 5 Lectures, commencing 3rd May.

Methods of dealing with outward and inward correspondence. Explanation of the following terms:—Debtor, Creditor, Journalising, Posting, Cash, Credit, Interest, and Discount.

Use of the day-book, cash-book, and ledger. Balancing and closing of these books.

Simple methods of keeping milk records and the accounts of a small dairy.

 CHEMISTRY AND PHYSICS.

 Professor BERRY.

JUNIOR CERTIFICATE COURSE.

Course of 15 Lectures, commencing 29th March.

How Matter exists.—Effects of heat upon solids, liquids, and gases. Thermometry. Latent heat. Specific heat. Solution. Colloidal state. Emulsion. Distillation. Specific gravity. The barometer and its indications.

Elements and Compounds.—Metals and non-metals. Oxygen. Hydrogen. Oxides. Acids. Bases. Salts. Oxidation and reduction.

The Atmosphere.—Its composition and impurities. Hygrometry. Dew and rain.

Water.—Hard and soft. Impure water. Hydrates.

The properties of the following elements and of their more important compounds:—Nitrogen. Carbon. Sulphur. Phosphorus. Chlorine. Potassium. Sodium. Calcium. Magnesium and Iron.

Organic Substances.—Starch. Sugar. Cellulose. Fats and Oils. Saponification. Albuminoids. Amides.

AGRICULTURAL BOTANY.

Professor M'ALPINE.

JUNIOR CERTIFICATE COURSE.

Course of 10 Lectures, commencing 12th April.

Fruits and Seeds.—Observations with naked eye and lens. Beans. Turnips. Mangel. Corn, &c.

Examination of Sprouted Seeds.—Germination. Growth of root and shoot. Root hairs.

Roots.—Their action as fixers and absorbers. Their action as soil solvents. Their action as makers of nitrogenous compounds. The soil as a sanitary habitat for roots. Examination of full-grown roots of turnips, mangels, beans, clover, and corn.

Shoots.—Their action as gas inhalers and exhalers. Microscopic observation of stomata. Examination of bulbous, tuberous, and creeping shoots. Braiding. Tillering.

Combined Action of Root and Shoot.—Production of food. Microscopic examination of the food stores of bean, turnip, and other plants. Circulation of sap.

Flowers.—Examination of leguminous flowers, cruciferous flowers, &c. Process of fertilisation.

IV.—SENIOR CERTIFICATE IN DAIRYING.

This course will extend over sixteen weeks, commencing on Monday, 31st May. Candidates for this Certificate are required to take practical instruction in Butter-making for not less than four weeks; in the making of hard and soft varieties of Cheese for not less than sixteen weeks; in Hand-milking of Cows as required; also to attend regularly

the following Courses of Lectures and Demonstrations and the class examinations in each subject :—

| | |
|-------------------------------------|--------------|
| Dairy Farming, | 20 Meetings. |
| Dairying (Senior Course), | 20 „ |
| Dairy Chemistry, | 20 „ |
| Agricultural Botany, | 20 „ |
| Dairy and Farm Book-keeping, | 20 „ |
| Poultry, | 5 „ |
| Bacteriology, | 20 „ |

EXAMINATIONS FOR CERTIFICATE.

At the end of the sixteenth week of the course practical examinations will be held in Milking, in Butter-making, and in the making of hard and soft varieties of Cheese ; also written and oral examinations on the subjects of the Lectures.

The scope of the examinations is indicated by the class syllabus in each subject.

Fee—£5 10s.

DAIRY FARMING.

Mr. STEVENSON.

SENIOR CERTIFICATE AND ADVANCED COURSES.

Course of 20 Lectures, commencing 26th July.

Systems.—Systems of dairy farming. Disposal of products—comparative returns. Stocking. Letting the cows. Capital required for the various systems. Rent and taxes. Cost of working.

Soils.—Origin of soils. The most suitable soils and situations. Water supply of the fields.

Cropping.—Rotation of crops. Advantages of rotations. Rotations best suited to dairying. Number of stock for a given acreage. Systems of cropping. Cultivation of the various crops. Manuring of crops.

Pastures.—Temporary and permanent pastures. Formation and management. The best pasture plants. Preparation of soil. Seeding. Mowing and grazing. Manuring. Natural and sown out meadows. Growing of hay. Haymaking. Ensilage.

Buildings.—Farm buildings for dairy stock. Plan of a dairy. Steading. Situation. Arrangement. Construction. Air space. Ventilation. Lighting. Drainage. Water supply.

Live Stock.—The dairy herd. Characteristics of the different breeds. General management. Principles of breeding. Pedigree. Rearing. Selecting. Drafting. Improving a herd. Milk records. Principles of feeding. Food stuffs—composition and comparative values. Influence of the various foods on the quality of the produce. The balanced ration. Summer and winter rations. Preparation of foods. Common diseases of dairy stock. Pigs. Breeds and management.

* *Bacon-Curing.*—Bacon-curing by salting. Cutting carcasses. Profitable and unprofitable carcasses. Rolled bacon. Fletch bacon. Curing hams. Fancy methods of curing. Spicing, &c. Pickling bacon. Smoking hams and bacon. Construction of smoke-room. Storing. Packing for hot climate. Utilisation of offal, &c.

* The Lectures on Bacon-Curing will be given by Mr. Thomas H. Steven.

DAIRYING.

Mr. STEVENSON.

SENIOR CERTIFICATE AND ADVANCED COURSES.

Course of 20 Lectures, commencing 23rd August.

Milk.—Physiology of the udder. The secretion of milk. Conditions affecting secretion. Composition. Properties of the various constituents. Variation in composition. Government standard. Triple standard. Methods of improving the quality. Properties of milk. Appearance under the microscope. Specific heat. Effects of heat upon milk. Liability to undergo fermentation. Specific gravity. Effect on specific gravity of the various constituents. Testing and grading of milk. Acidimeter. Fermentation tests. Estimation of fat. The Babcock and Gerber tests. Determination of specific gravity. The lactometer and Westphal balance. Calculation of total solids. Milking trials for cows. Basis of comparison. The sale of milk. Milk contracts. Payment according to quality. Treatment of milk for sale. Abnormal milk. Colostrum. Importance of cleanliness. Milk strainers. Cooling and refrigerating. Bottling. Preservatives in milk. Pasteurising. Construction of various pasteurisers.

Cream.—Composition. Principles of separation. Gravity and centrifugal methods. History of separators. Construction of different types. Conditions affecting the efficiency of separation and the percentage of cream taken off. Quality of cream for different purposes. Testing. Sale of cream. Preservatives allowed. Clotted cream.

Butter and Butter-making.—Composition and general properties. Grading of butter. The scale card. Principles of butter-making. Different kinds of churns. Churning of whole milk, sweet cream, and ripened cream. Effects of ripening. Different methods of ripening. Natural and culture starters. Acidity of cream for churning. Testing the acidity. Conditions affecting the churnability. Effects of temperature. Ventilation of the churn. Circumstances affecting the flavour and keeping properties. Packing. Preserving. Defects in butter. Influence of food. Butter ratio. Overrun. Estimation of water and fat in butter. Regulations *re* moisture and preservatives in butter.

Cheese and Cheese-making.—Principles of cheese-making. Hard and soft varieties. Distribution of the milk solids. Agents employed. Preparation and properties of rennet. Standardising rennet. Coagulation. Annatto. Use of natural and culture starters. Preparation of the milk. Importance of acidity. Tests for acidity in milk and curd. Control of fermentation at the different stages. Effects of temperature. Cooking of the curd. Pasteurised milk for cheese-making. Salting. Pressure. Ripening. Storing. Grading of cheese. Use of the scale card. Defects in cheese. Discolouration. Composition of different varieties. Filled cheese. Cheese ratio.

By-products of Milk.—Buttermilk. Skim milk. Separated milk. Whey. Composition, uses, and values.

Buildings.—The farm dairy. Milk collecting depots. Creameries. Factories. Plans. Situation, arrangement, construction. Ventilation. Drainage. Water supply.

Dairy Appliances.—Construction, cost, and use. Fitting up of the modern farm dairy. Equipment of creameries and factories. Steam boilers. Milking machines. Refrigerating machines. Refrigerators. Cream separators. Pasteurisers. Churns. Vats. Presses, &c.

DAIRY CHEMISTRY.

Professor BERRY.

SENIOR CERTIFICATE AND ADVANCED COURSES.

Course of 20 Lectures, commencing 1st June.

Average Composition of Milk.—The milk fat. Physical condition of fat in milk. Specific gravity. Specific heat—conductivity; co-efficient of expansion. Cream raising. Chemical characters of fat in milk. Circumstances influencing milk fat. Comparison with ordinary fats. Heat value. The milk casein—physical condition; relation to ash constituents, to temperature, to age, to

feeding, to special circumstances, to cream raising. Chemical composition of casein. Acid curd. Rennet curd. Lactalbumin. Lacto-globulin. Colostrum. Old milk. The milk sugar—its physical characters, chemical composition, and heat value. Lactic fermentations. Alcoholic fermentation. Reaction of milk. Action and detection of milk preservatives. Pasteurisation and sterilisation. Ash in milk—its physical and chemical properties; relation to organic constituents; to soil exhaustion.

Variations in Composition of Milk.—Circumstances influencing. Methods of milk analysis. Buying and selling milk. Milk standards.

Cream.—Raising. Relation of souring to ripening. The skim milk. The separator. Colour, taste, and smell. Physics of churning. Heat. The butter milk.

Butter.—Composition. Water standards. Influence of food and management. The water supply of the dairy. Salt. Butter preservatives. Packing. Analysis of butter. Composition and physical characters of margarine.

Cheese.—Action of rennet. Influence of temperature. Salt. Acidity. The ripening process. Analysis of cheese. Filled cheese. The whey.

AGRICULTURAL BOTANY.

Professor M'ALPINE.

SENIOR CERTIFICATE AND ADVANCED COURSES.

Course of 20 Lectures, commencing 31st May.

Review of the Action performed by Green Plants.—Drinking. Food making. Transpiring. Growing. Seeding.

Special Study of Cruciferae.—Turnips. Swedes. Mustard. Charlock. Runch. Life-history. Growth and duration. Reproduction. Nutritive value. Diseases—finger and toe.

Leguminous Plants.—Root tubercles and symbiosis. Feeding. Seeding. Nutritive value.

The Clovers.—Identification by leaf, flower, and seed. Mode of growth and duration. Root depth. Liability to disease.

Grasses in general.—Tillering. Duration. Top and bottom. Construction of ear and seed.

The best Top Grasses.—Mode of growth. Duration. Agricultural and nutritive value. Identification by leaf, by ear, and by seed.

The best Bottom Grasses.—Perennial ryegrass.

Grass and Clover Mixtures.—Mixtures of short duration. Permanent mixtures—clovers, top grass, bottom grass.

- Hay*.—Botanical composition and nutritive value. Time of flowering and cutting. Judging value of hay.
- Pasture*.—Clover. Top grass. Bottom grass. Improvement and deterioration. Judging value of pasture.
- Weeds* found in pasture, hay, and cropped land.

DAIRY AND FARM BOOK-KEEPING.

Mr. ROBB.

SENIOR CERTIFICATE AND ADVANCED COURSES.

Senior Course of 20 Lectures, commencing 28th June.

Business Routine.—Methods of dealing with correspondence. The letter book, letter register, paid and unpaid accounts.

Description and use of Books.—Day book, cash book, journal, ledger, and bank book. Cheques and bills of exchange.

The various books that a farmer should keep, their nature and use. Balancing the cash book. Posting, balancing, and closing the ledger. Making up a profit and loss account. Valuation and balance sheet.

Methods of keeping accounts as adopted for large dairies and butter and cheese factories. Papers taken from actual farming and dairy transactions will be given and worked out by the class.

POULTRY.

Miss KINROSS.

SENIOR CERTIFICATE AND ADVANCED COURSES.

Course of 5 Lectures, commencing 31st May.

Breeds.—Classification of various breeds. Those suited for heavy and for light soils. Description of various breeds. Selection of stock. Improvement of ordinary stock. Various crosses for egg production and for table use.

Houses and Housing.—General principles of construction and location. Various forms of houses. Scratching sheds. Confined runs.

Natural and Artificial Incubation.—Selection of eggs. Management of sitting hens. Management of incubators. Requirements for success. Testing of eggs. Rearing of chickens—naturally, artificially.

Foods and Feeding.—Description of various poultry foods. Methods of feeding. When to feed. Rations for summer and winter. Moulting. Age of stock birds. Cost of feeding.

Ducks, Geese, Turkeys.—Breeds. Selection. Housing. Rearing. Feeding. General management.

BACTERIOLOGY.

Mr. STEVENSON.

SENIOR CERTIFICATE AND ADVANCED COURSES.

Course of 20 Lectures, commencing 27th July.

Introduction.—Discovery of bacteria. Evidences of bacteria in nature. Distribution of bacteria.

Morphology.—Form, size, and structure. Vegetative and spore forms. Classification of bacteria.

Biology.—Conditions of growth. Influence of temperature, air, moisture, food, light, antiseptics, and disinfectants. Effects of their own products. Reproduction. Fission. Spore formation. Germination of spores. Chemical and physical effects produced by bacteria. Saprophytes and parasites. Pathogenic bacteria. Enzymes.

Yeasts and Moulds.—Common species. Structure and growth. Effects in dairying.

Bacteria and Milk.—Milk as a medium for bacteria. Control of bacterial growth in milk. Sources of contamination. Importance of cleanliness. Milk drawn by machine. Cooling. Pasteurising. Sterilising. Refrigerating. Chemical preservatives. Buddised milk. Condensed milk. Bacteria commonly found in milk. Normal and abnormal. Milk-borne diseases. Elimination of taints. Fermentation and curd tests.

Bacteria and Butter-making.—Ripening of cream. Changes during ripening. Development of acid, flavour, and aroma. History and use of starters. Preparation of home-made starters. Principles of culture cream ripening. Advantages. Characteristics desired in culture starters. Propagation of culture starters. Bacteria in butter from (1) sweet cream, (2) ripened cream. Bacterial defects in butter.

Bacteria and Cheese-making.—Ripening of the milk. Use of starters. Bacteria and enzymes in rennet. Bacteria in "green" cheese. Physical and chemical changes in ripening cheese. Theories of cheese ripening. Pepsin-acid digestion. Ripening of soft cheese. Bacterial defects in cheese.

Methods of Bacteriology.—Microscopical examination. Staining. Cultivation on different nutritive media. Preparation of media. Plate cultures. Pure cultures. Streak and stab cultures. Shake cultures. Roll tube cultures. Bacteriological analysis, qualitative and quantitative, of milk, butter, cheese, and water.

Practical laboratory instruction will be given to pupils preparing for the College Diploma Examination to such an extent as may be required.

V.—COLLEGE DIPLOMA IN DAIRYING.

The College awards a Diploma in the Department of Dairying to students who have completed a course of study extending over two Winter and one Summer session, in accordance with the regulations, and who have passed the necessary examinations. The title is College Diploma in Dairying, Glasgow, "C.D.D.(Glas)." The subjects of study for the Diploma in the Department of Dairying are—(1) Chemistry, covering only the subjects included in the first winter's course; (2) Botany; (3) Book-keeping; (4) Dairy Bacteriology; (5) Poultry; (6) Agricultural, including Dairy Chemistry; (7) Agricultural Botany; (8) Agricultural Zoology; (9) Veterinary Science; (10) Agriculture, including Dairying and Dairy Farming; (11) Practical Dairy Work (milking, butter-making, and cheese-making).

(For further regulations, see College Calendar for 1908-9.)

(Candidates for the Diploma in Dairying who have attended classes in the prescribed subjects in any of the three Scottish Agricultural Colleges, and who have passed the corresponding examinations, will be held to have qualified in such subjects, but all candidates must attend at the Dairy School the courses of study (theoretical and practical) prescribed for the Senior Certificate in Dairying, and pass the examinations required for that Certificate.)

The course for this Diploma will extend over two winter sessions at the College, and one summer session (4 months) at the Dairy School. Candidates are required during the summer session to take the full courses of practical instruction, as prescribed for the examinations for the Senior Certificate; also to attend regularly during the winter and summer sessions the following Courses of Lectures and Demonstrations—the classes to be taken in the following order :—

(Part I.)—First Winter.

General Chemistry—50 Lectures and Practical Work in Laboratory.

General Botany—50 Lectures and Practical Work in Laboratory.

Agricultural Zoology—40 Lectures and Demonstrations.
Soils and Manures—40 Lectures.

Special Composition Fee for above Classes, £5 10s.

(Part II.)—Summer Session.

Practical Dairy Work, including the Hand-milking of
Cows, making of Butter and of hard and soft
varieties of Cheese.

| | |
|-------------------------------------|---|
| Dairy Farming, | 20 Lectures. |
| Dairying (Senior Course), | 20 „ |
| Dairy Chemistry, | 20 „ |
| Agricultural Botany, | 20 „ |
| Dairy and Farm Book-keeping, | 20 „ |
| Poultry, | 5 „ |
| Dairy Bacteriology, | 20 Lectures and Practical Work in Laboratory. |

Composition Fee—Scotch students, £6; others, £7 10s.

(Part III.)—Second Winter.

| | |
|---------------------------------|------------------------------------|
| Senior Agriculture, | 100 Lectures. |
| Veterinary Science, | 50 „ |
| Agricultural Chemistry, | 50 Lectures and Practical Work. |
| Agricultural Botany, | 50 Lectures and Practical Work. |
| Dairying (Bacteriology), | 10 Lectures. |

Composition Fee—£7 10s.

EXAMINATIONS FOR THE DIPLOMA.

Students must attend all the class examinations in each of the lecture courses. Diploma examinations will be held at the end of each session, and students must present themselves for examination in Part I. at the end of the first winter session; in Part II., including milking and practical cheese and butter making, at the close of the summer session; and in Part III. at the end of the second winter session.

The scope of the examinations is indicated by the class syllabus in each subject.

VI.—THE NATIONAL DIPLOMA IN DAIRYING.

This Diploma is granted conjointly by the Highland and Agricultural Society of Scotland and the Royal Agricultural Society of England, on the results of a Theoretical and Practical Examination, which is held at the Dairy School about the beginning of October.

A copy of the Regulations may be obtained from the Secretary of the Highland and Agricultural Society, 3 George IV. Bridge, Edinburgh.

(1) Candidates for this examination may attend the Dairy School for practical instruction in Butter-making, Cheese-making, and Milking during any part of the summer session. Fee—1s. per day, or 5s. per week.

(2) Candidates may also, if they please, attend the full course of Lectures and Practical Instruction for the Senior Certificate of the College, and enter for this examination, according to the Regulations given on page 23.

(3) Candidates for this examination who do not desire to prepare for the College Senior Certificate may, in addition to their practical courses, enrol in each or any of the courses of Lectures delivered at the Dairy School during the summer session. Fee for each course of not less than twenty Lectures, £1 1s.

DAIRY SCHOOL CLASSES.

TABLE OF FEES.

| | Scotch Students. | | | Other Students. | | |
|--|------------------|----|---|-----------------|----|---|
| I. Practical Instruction only, per day, ... | £0 | 1 | 0 | £0 | 1 | 0 |
| " " per week, ... | 0 | 5 | 0 | 0 | 6 | 0 |
| II. Courses of Lectures for Certificate in Butter-making, including four weeks' Practical Instruction, | 1 | 15 | 0 | 2 | 5 | 0 |
| III. Courses of Lectures for Junior Certificate, including eight weeks' Practical Instruction, | 3 | 0 | 0 | 3 | 15 | 0 |
| IV. Courses of Lectures for Senior Certificate, including sixteen weeks' Practical Instruction, | 5 | 10 | 0 | 7 | 0 | 0 |
| V. Courses of Lectures and Laboratory Work for Diploma, including sixteen weeks' Practical Instruction, | 6 | 0 | 0 | 7 | 10 | 0 |
| VI. For each Course of not less than twenty Lectures, | 1 | 1 | 0 | 1 | 1 | 0 |
| VII. Four Weeks' Winter Course, | 1 | 10 | 0 | 2 | 0 | 0 |

TIME-TABLE OF CLASSES FOR THE CERTIFICATE IN BUTTER-MAKING AND THE
JUNIOR CERTIFICATE IN DAIRYING (COMMENCING 29TH MARCH, 1909).

| Class. | Students. | Lecturer. | Commencing. | Days. | Hours. | Duration. |
|-----------------------|--|-----------------|--------------------------|-------------|--|-------------------------|
| Chemistry (Junior), | Junior Certificate. | Prof. Berry. | 29th Mar. 12th April. | Daily. " | 3.20 to 4.20 p.m. 4.20 to 5.20 p.m. | Two weeks. One week. |
| Botany (Junior), ... | Do. | Prof. M'Alpine. | 12th April. | " | 3.20 to 4.20 p.m. | " |
| Dairying (Junior), { | Butter-making Certificate. Junior Certificate. | Mr. Stevenson. | 26th April. | " | 3.20 to 4.20 p.m. | Four weeks. |
| Milk-testing, ... | Do. | Do. | 26th April. | " | 4.20 to 5.20 p.m. | One week. |
| Book-keeping (Junior) | Do. | Mr. Robb. | 3rd May. | " | 4.20 to 5.20 p.m. | " |

TIME-TABLE OF CLASSES FOR THE SENIOR CERTIFICATE IN DAIRYING
(COMMENCING 31ST MAY, 1909).

| Class. | Students. | Lecturer. | Commencing | Days. | | Hours. | Duration. |
|-----------------------------|------------------------------|-----------------|--------------------------------|-------------------|--------------------|-------------------|--------------|
| | | | | First Four Weeks. | Second Four Weeks. | | |
| Agricultural Botany, { | Advanced Senior Certificate. | Prof. M'Alpine. | { Monday, } { 31st May. } | M., W., & F. | { Tu. & Th. } | 3.20 to 4.20 p.m. | 20 Lectures. |
| Poultry, ... | " | Miss Kinross. | { Monday, } { 31st May. } | M., | M., | 4.20 to 5.20 p.m. | 5 Lectures. |
| Dairy Chemistry, } | " | Prof. Berry. | { Tuesday, } { 1st June, } | Tu. & Th. | { M., W., & F. } | 3.20 to 4.20 p.m. | 20 Lectures. |
| Dairy Farming, | " | Mr. Stevenson. | { Monday, } { 26th July. } | Daily. | Daily. | 3.20 to 4.20 p.m. | " |
| Dairy & Farm Book-keeping } | " | Mr. Robb. | { Monday, } { 28th June. } | M., W., & F. | { M. & F. } | 4.20 to 5.20 p.m. | " |
| Bacteriology, | " | Mr. Stevenson. | { Tuesday, } { 27th July. } | Tu. & Th. | { M., W., & F. } | 4.20 to 5.20 p.m. | " |
| Dairying (Senior), } | " | Do. | { Monday, } { 23rd Aug. } | Daily. | Daily. | 3.20 to 4.20 p.m. | " |

POULTRY DEPARTMENT

(Adjoining the College Dairy School),

HOLMES FARM, KILMARNOCK.

The Courses of Instruction are arranged to meet the varied requirements of all classes of students in the Theory and Practice of Poultry-keeping.

PRACTICAL INSTRUCTION.

Students desiring instruction in Practical Work may commence at any time. The instruction includes the use of all the modern appliances connected with the natural and artificial methods of hatching and rearing chickens, ducks, geese, and turkeys; the feeding, fattening, killing, shaping, and dressing of table poultry.

Fee, 5s. per week to pupils from contributing counties, and 6s. per week to all others.

LECTURES WITH DEMONSTRATIONS.

Two Special Ten Weeks' Courses will begin on 5th April and 5th July respectively. A full course of practical work will be included along with the lectures.

SYLLABUS OF TWENTY LECTURES FOR THE SPECIAL TEN WEEKS' COURSES.

1. Various branches of poultry-keeping—alone; in connection with ordinary. Egg production. Table poultry. Day-old chick trade. Raising stock birds.
2. *Breeds*.—Classification of different breeds. Description of various breeds and varieties. Characteristics of laying and table fowls.
3. *Selection and Breeding*.—For egg production. For table purposes. Crossing. Various crosses suitable for egg production and for table. Improvement of ordinary stock.
4. *Natural Hatching*.—Selection of eggs. Preparation of nest. Management of sitting hens. Testing of eggs.
5. *Artificial Incubation*.—Requirements for success. Incubator house. Management of incubators. Different makes of machines.
6. *Rearing of Chickens*.—Naturally. Artificially. Description of various Coops and Brooders. Winter rearing of chickens. Feeding.
7. *Houses and Housing*.—General principles of construction and location. Various forms of houses. Scratching sheds. Management of confined runs. Cleanliness.



POULTRY DEPARTMENT.

[To face page 94]

1. The first part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, which are based on the principle of the uncertainty of the position and momentum of the particles.

2. The second part of the paper is devoted to a discussion of the results of the experiments on the structure of the atom. It is shown that the results of the experiments are in good agreement with the predictions of the theory of the structure of the atom.

8. *Foods and Feeding*.—Description of various poultry foods. What to feed. When to feed. Methods of feeding. Rations for summer and winter feeding. Cost of feeding.
9. *Winter Egg Production*.—How to select and breed for winter eggs. Seasonable hatching. Age of stock birds. Housing for general comfort. Feeding of laying stock. Treatment of birds during moulting.
10. *Fattening and Marketing of Chickens*.—Fattening. Cramming. Cost of fattening. Killing. Plucking. Shaping. Trussing. Packing of chickens for market.
11. *Breeding and Management of Turkeys*.—Breeds. Selection. Housing. Hatching and rearing. Feeding. General management.
12. *Breeding and Management of Ducks*.—Breeds. Selection. Housing. Hatching and rearing. Feeding. Value of duckling trade. General management.
13. *Breeding and Management of Geese*.—Breeds. Selection. Housing. Hatching and rearing. Feeding. General management.
14. *Diseases of Poultry*.—Causes. Various symptoms. Preventives. Cures. Parasites.
15. *Marketing and Preservation of Eggs*.—Packing and marketing of eggs. Various methods of preservation.
16. *Origin of Poultry*.—Early history. Domestication. Development of the industry. Requirements for further development. Value of manure. Labour.
17. *The Embryology of the Chicken*.—The structure of egg. Development of embryo. Changes which take place in the egg till chick is hatched.
18. *Anatomy of Fowl*.—Skeleton. Skin. Muscles. Feathers.
19. *Internal Organs*.—Digestive. Respiratory. Circulatory.
20. Soils suited for poultry-keeping.

FIELD DEMONSTRATIONS.

During the summer demonstrations will be given by the College Staff, on the Experiment Station, Holmes Farm, on the first Saturdays of June, July, August, and September. Farmers, students, members of agricultural associations, and all others interested are invited to attend. Special arrangements can also be made on other dates for the conduct of any society or party over the Station.

SPECIAL MONTH'S COURSE OF DAY CLASSES FOR FARMERS,

TO BE HELD

IN THE COLLEGE, BLYTHSWOOD SQUARE, GLASGOW,

From 11th January to 5th February, 1909.

The following short courses of instruction have been arranged for the benefit of farmers and farmers' sons who are occupied on the farm during the greater part of the year, and who are, therefore, unable to spare the time required to attend classes throughout the whole winter session. These special classes have been arranged to be held at a time when farmers can most conveniently attend.

The courses of lectures and laboratory instruction to be given within the month are specially designed to be of a practical character—*i.e.*, to convey to practical men the results of those scientific discoveries relating to agriculture which seem to be capable of the readiest application to actual farm practice.

The hours for lectures and laboratory work in the course have been arranged with a view to the convenience of those who reside in the immediate neighbourhood of railway stations having rapid and frequent communication with Glasgow. Farmers so situated may be able to give their mornings to the work of the farm, to travel to the city in time for the afternoon classes, and to return home in the evenings. Those who may be unable to travel daily to and from their homes will have no difficulty in finding cheap and comfortable lodgings in all parts of the city. In addition to the lectures and the laboratory instruction, arrangements have been made to hold excursions on several Saturdays to farms having features of special interest, as well as to the College Experiment Station, Holmes Farm. Particulars of these excursions will be intimated in due time.

The fee for attendance on all the lectures, the laboratory work, and the excursions for the month, is £2. Students

may obtain comfortable board and lodgings in Glasgow, at reasonable rates. The fee for attendance for two weeks only will be £1, or for any single Course of Lectures, 10s. Students who are ratepayers, or whose supporting parents or guardians are ratepayers, in the administrative districts of any of the Councils contributing to the support of the College, will be charged a fee of £1 only for the full Course. The Councils at present contributing are the County Councils of Ayr, Argyll, Bute and Arran, Dumfries, Dunbarton, Kirkcudbright, Lanark, Perth, Renfrew, Stirling, and Wigtown, and the Town Councils of Glasgow and Kilmarnock.

FOUR WEEKS' COURSE,

TO BE HELD
IN THE COLLEGE, BLYTHSWOOD SQUARE, GLASGOW.

TIME TABLE.

FIRST FORTNIGHT—11th to 22nd January.

- | | |
|------------------|---|
| 2—3.15 p.m.,.... | Professor Berry, "Foods and Feeding, with Practical Instruction in the Laboratory." |
| 3.15—4.15 p.m., | Mr. M'Call, "Veterinary Science." |
| 4.15—5 p.m.,.... | Interval. |
| 5—6 p.m.,..... | Professor M'Alpine, "Agricultural Botany, including Laboratory Work." |

SECOND FORTNIGHT—25th January to 5th February.

- | | |
|------------------|---|
| 2—3 p.m.,..... | Professor Berry, "Foods and Feeding, with Practical Instruction in the Laboratory." |
| 3.15—4.15 p.m., | Professor Wright, "Manures and Manuring." |
| 4.15—5 p.m.,.... | Interval. |
| 5—6 p.m.,..... | Professor M'Alpine, "Agricultural Botany, including Laboratory Work." |

This course of classes commences on Monday, 11th January, at the hour above mentioned.

A series of Excursions to farms of interest will be held on Saturdays. Due intimation of the arrangements made for these excursions will be given.

NOTE.—The following Syllabuses may be modified at the discretion of the Lecturers, and are only to be taken as indicating the general lines of the instruction that will be given in the classes.

SYLLABUSES.

COURSE OF TEN LECTURES ON MANURES AND MANURING.

Professor R. PATRICK WRIGHT.

Objects and use of manures. Why required in soils. How plants feed, and what they feed on. Ingredients deficient in soil, and how they can be supplied.

Nitrogenous manures. Nitrate of soda. Its composition and value. Crops for which it is most suitable. Its exhausting effects. Proper and improper uses. Precautions to be taken. Returns obtained on corn, hay, and roots.

Sulphate of ammonia. Its composition. Its value compared with nitrate of soda. Other nitrogenous manures. Soot. Hair refuse. Shoddy. Feathers, &c. How to value nitrogen in manures.

The bone manures. Bone meal. Its valuable ingredients. Its use on pastures and other crops. Steamed bone flour. How it compares with bone meal.

Dissolving of bones and other phosphates. The effect on their composition and value. Dissolved bones and vitriolated bones. Bone compounds. How to value their separate ingredients.

Mineral phosphates. Superphosphate. Superphosphate *v.* dissolved bones. Basic slag and other phosphates. Effects on root, corn, and hay crops.

Potassic manures. Kainit. Sulphate of potash. Muriate of potash. Effects on clovers, potatoes, and other crops. Relative values.

COURSE OF TWENTY LECTURES ON AGRICULTURAL BOTANY.

Professor A. N. M'ALPINE.

The Cultivated Clovers.—Habits, agricultural and nutritive values. Suitable soils and manures. Influence of season and climate. Relation to preceding and succeeding crops. Prevention of crop failure and diseases. Clover sickness.

The best Grasses.—Character and habits. Top and bottom grasses. Propagation, tillering, and duration. Agricultural and nutritive values. Suitable soils. Favourable and unfavourable soils, seasons, and climates. Aids to growth.

Pasture.—Natural pasture, how produced : its lessons. How natural differs from artificial pastures. Mode of producing so-called artificial pasture. Causes of success and failure : Treatment. Compatibility of the various components. Points of good and bad pasture. The best pasture plants.

Hay.—The best and most suitable plants. Comparative effects and after-effects of grazing and mowing. Combinations of depasturing and mowing. When the plants are ready for cutting. Yield. Points of a good hay.

Weeds.—Their sources and distribution. Habits of prevalent types. Couch and white grass (agrostis). Prevention and eradication.

Grass Seeds.—How to know commercial value. What is "the best" seed? Precautions necessary to secure best seed. Construction of rye grass and clover seeds. Size of seed and depth of sowing.

Seed Mixtures.—Special objects of mixtures. Classification and selection of components. Amount of germinating seed to cover an acre. Allowance for various losses. Mixture prescriptions and how to make them up. Components. Percentage for each component per acre. Pounds of germinating seed for each component. Success and failure.

Purity of Seeds.—Nature of impurities. Seed value as affected by purity. Foreign and home-grown seeds : distinction by impurities. Sulphuring and doctoring. Table of impurities.

Germination of Seed.—What is germination? Age, weight, and size of seed in relation to germinating power. Determination of germinating power by slow and rapid methods. Is knowledge of germinating power indispensable?

The Plant as a Food Producer.—No plant food exists in soil and air. Plant manufactures food. Complete identity between plant and animal food. Action of a green leaf. Food manufacture.

PRACTICAL WORK.

Identification of clover plants by leaf, flower, and habit. Identification of common grasses. Identification of the most important weeds. Identification of grass seeds. Testing seed purity. Testing germinating power. Use of the microscope. Microscopic examination of root, leaf, and seed.

FOODS AND FEEDING, WITH PRACTICAL WORK IN THE LABORATORY.

Professor BERRY.

The course will be devoted principally to animal nutrition and foods and feeding.

The Constituents of Animals.

Process of Nutrition.

Food Constituents and their Functions.—Milk as a model food. Sugar. Starch. Fat. Albumin. Water. Mineral matter.

How Food is Utilised.—Digestion. Absorption. Circulation. Assimilation. Production of living matter.

How Living Matter Acts.—Respiration. Heat. Force. Production and excretion of waste.

Composition of Foods.—Classes of foods. Foods grown on the farm. Imported foods.

Digestibility of Foods.

Albuminoid Ratio.

Feeding.—Relation of food to (1) kind of animal, (2) age of animal, (3) special object in view. Relation of food to manure.

Food Preparation.—Mixing foods. Cooking. Steaming. Spicing.

Practical work will be undertaken in the laboratory, including the examination of feeding stuffs to detect adulterations.

Tests for the detection of starch, sugar, cellulose, etc.

Action of diastase on starch, and of pepsin and an acid on albumin.

Examination of milk, etc.

COURSE OF TEN LECTURES ON VETERINARY SCIENCE.

Professor JOHN R. M'CALL

Osteology.—General outline of the skeleton of the horse and ox, with special reference to the bones in the fore and hind limbs of the horse.

Veterinary Medicine and Surgery.—The more important diseases of the fore and hind limbs of the horse, including splints, ringbones, side-bones, and stringhalt. Detection of lameness. First aid in dealing with cuts, wounds, strains, choking, etc. Care of pregnant animals. Nursing sick animals. Administration of purgatives to animals, and precautions to be exercised. Dentition of horse and ox, and method of telling the age of these animals.

Special Diseases.—Anthrax, tuberculosis, colic, and swine fever.

Note.—In this course practical demonstrations on the common diseases affecting the limbs of horses will be given on living animals, specially selected, to show the typical appearances produced by these diseased conditions.

SPECIAL FOUR WEEKS' WINTER COURSE IN DAIRYING.

A Special Class will be held at the Dairy School, Holmes Farm, Kilmarnock, for four weeks, commencing on Monday, 11th January, 1909. This class has been specially instituted for the benefit of practical cheese-makers who are unable to attend the Dairy School during the summer months.

Daily instruction in Cheese-making and Butter-making will be given throughout the month. A course of twenty Lectures on Dairying will also be given. The lectures are specially adapted to the requirements of practical men, and are intended to convey to them a knowledge of those scientific discoveries which seem to be capable of application to existing dairy practice. An examination in the theory of Dairying and in practical Cheese and Butter Making will be held at the end of the course.

Fee for attendance during the month on the Practical Instruction and the Course of Lectures, Scotch Students, £1 10s.; other Students, £2.

DAIRYING.

Mr. STEVENSON.

Milk.—Nature and composition. Properties of the various constituents. Variation in composition. Government standard. Causes of variation. Properties of milk. Liability to undergo fermentations. Causes of fermentation in milk and milk products.

Bacteria.—Definition. Form, size, and structure. Reproduction. Rate of increase. Conditions of growth. Milk as a medium for bacteria. Bacteria commonly found in milk. Useful and injurious bacteria. Milk-borne diseases. Control of bacterial growth in milk and milk products. Importance of cleanliness. Cooling. Pasteurising. Sterilising. Use of starters. The water supply.

Milk-testing.—Methods of sampling. Composite samples. Estimating the percentage of fat. The creamometer. The Babcock test. The Gerber test. Determination of specific gravity. The lactometer. The Westphal balance. Corrections for temperature. Calculating the percentage of total solids from the specific gravity of the percentage of fat.

Butter and Butter-making.—Composition and general properties. Scale of points. Principles of butter-making. Separation of cream. Preparation of cream for churning. The effects of ripening. Testing acidity. The acidimeter. Circumstances affecting the flavour, aroma, texture, grain, colour, and keeping properties. Preserving of butter. Common defects. Butter ratio.

Cheese and Cheese-making.—Composition. Principles of manufacture of hard cheese. Agents employed. Rennet and coagulation. Solids involved. Annatto. Salt. Starters. Preparation of the milk. Importance of acidity. Tests for acidity. Effects of temperature. Control of fermentation in milk and curd. Ripening of hard cheese. Common defects in cheese. Discoloration. Cheese ratio.

The Dairy Cow.—Characteristics. Comparison of the dairy breeds. General management. Foods and feeding. Summer and winter rations.

Dairy Buildings.—Situation. Arrangement. Construction. Ventilation. Lighting. Drainage. Water supply.

Dairy Appliances.—Selection of machinery and utensils. The fitting up of the modern dairy.

EXTENSION WORK.

The extension work carried on by the College comprises :—

1. The conduct of classes at local centres in the contributing counties on any branch of Agricultural Science, including Forestry, Horticulture, Beekeeping, Poultry, and Dairying.
2. The delivery of courses of lectures, or single lectures, in country centres.
3. The conduct of experiments with manures, crops, and farm stock.
4. The delivery of lectures, and the publication and circulation of reports, on the results of the experiments.
5. The giving of advice and information to farmers within the contributing counties.
6. The conduct of investigation and research.

THE FARM.

The Governors have leased Holmes Farm, Kilmar-nock (about a mile from the railway station). The farm extends to 200 acres or thereby, and is well adapted

for experiment and demonstration purposes. Twenty acres have been marked off in experiment plots, and the remainder of the farm is sub-let to a tenant who manages it in accordance with the general practice of the district. Various pure breeds of farm live stock are kept, and systematic experiments are conducted on the growth and treatment of crops. The experiment plots may be visited at any time by students, farmers, and all others interested, and the Superintendent of the Station will give all necessary explanations. Special demonstrations are also given from time to time by the Principal and other members of the staff.

The Dairy School is situated on the farm. The school is fitted with all the requisite appliances for Pasteurising milk, for Buttermaking, and for Cheddar, Stilton, and Cream Cheesemaking. The milk of about 120 cows is handled daily during the summer months, part being made into butter and the remainder into cheese. Pupils attending the school are required to take part in all the practical work.

ADVISORY DEPARTMENT.

The services of the Staff of the College will be accorded on the conditions stated below to all farmers residing within the bounds of the counties contributing to the support of the College, for the following purposes :—

- (1) Questions will be answered and advice given on any points of doubt which arise in agricultural practice relating to the tillage of soils, the cultivation and manuring of crops, removal of weeds, prevention and treatment of plant diseases, breeding and feeding of live stock, the management of the dairy, and the manufacture of dairy produce.
- (2) Members of the Staff will be prepared to visit farms, when desired, to examine into specific circumstances, such as failures and diseases of crops, deterioration of pasture, etc., and to report thereon. Dairies will also be visited, and suggestions made on butter and cheese making.

- (3) Samples of grass and clover seeds may be sent to the College to be examined and tested, and a report will be made on the following points :—

Clover Seeds.—(a) Determination of percentage of hard seeds.

(b) Percentage of broken and rotten seeds.

(c) Percentage of purity—nature of impurities.

(d) Percentage of germination.

Grass Seeds.—(a) Percentage of purity—nature of impurities.

(b) Percentage of germination.

- (4) *Identification of Plants.*—Any plant may be sent to the College for identification, and for a report on its habits and agricultural value. Means for the prevention or extermination of weeds will be suggested.

- (5) *Insect Pests.*—Specimens of insects infesting crops, fruit trees, poultry, or live stock, may be sent to the College for identification, and reports will be given on the best means of prevention and extermination.

- (6) *Examination of Milk.*—Samples of milk may be sent for physical examination and report regarding the percentage of butter fat, defects, and other qualities.

- (7) *Bacteriological Examination.*—Samples of milk, butter, and cheese may be sent for examination and report.

- (8) *Advice in Purchasing Manures.*—Circulars or invoices showing the guaranteed analysis and the price of manures offered for sale to farmers may be sent in, and a report will be furnished on the value and suitability of the manures.

Conditions under which the services of the Staff will be given :—

- (1) All communications relating to this Department of the College work must be addressed to Principal

Wright, The West of Scotland Agricultural College,
Blythswood Square, Glasgow.

- (2) Farmers desiring to send samples or specimens must apply, in the first instance, for a schedule of instructions.
- (3) The College reserves the right to refuse samples.
- (4) All samples, &c., must be forwarded carriage paid, and the fees stated below (where one is charged) must be sent at the same time. Where seeds, manures, feeding stuffs, &c., have been purchased under a guarantee, a copy of the invoice showing guarantee and price must accompany the samples.
- (5) The reports on manures, feeding stuffs, &c., are given solely for the *bona fide* information of farmers, and must not be used for trade purposes or as a basis for any legal action.

TERMS.

No charge is made for any part of the above work except for Bacteriological Examinations (No. 7), for which a fee will have to be paid, amounting to £1 1s. or more, as may be arranged. Also, when members of the staff are asked to visit farms, their travelling expenses must be paid by the applicants for their services.

REPORT ON THE WORK OF THE COLLEGE DURING SESSION 1907-1908.

I.—IN COLLEGE WORK.

DAY CLASSES.

| | | |
|---|---|-----|
| Number of Individual Students, | . | 138 |
| Number attending— | | |
| Intermediate Agriculture (Soils and Manures), | . | 28 |
| Advanced ,, - - - | | 28 |
| Introduction to General Botany, | - | 11 |
| Agricultural Botany, Junior Lectures, | | 30 |
| Do. do., Junior Practical, | - | 30 |
| Do. do., Senior Lectures, | - | 20 |
| Do. do., Senior Practical, | | 20 |
| General Chemistry, Lectures, | - | 31 |
| Do. do., Practical, | - | 31 |
| Veterinary Chemistry, Lectures and Practical, | | 11 |
| Agricultural Chemistry, Senior Lectures, | - | 17 |
| Do. do., Senior Practical, | - | 18 |
| Zoology, | - | 23 |
| Veterinary Science, | - | 32 |
| Agricultural Engineering, | | 7 |
| Forestry, - - - - | | 8 |
| Special Farmers' Course, | - | 21 |
| Special Winter Dairy Course, | | 41 |

EVENING CLASSES.

| | |
|--------------------------------|----|
| Number of Individual Students, | 98 |
| Number attending— | |
| Agriculture, Junior, | 42 |
| Do., Senior, | 17 |
| Dairying, - | 34 |
| Bacteriology, | 16 |
| Forestry, 1st Year Course, | 6 |
| Do., 2nd do., | 6 |

EVENING CLASSES (*continued*)—

| | |
|--|-----|
| Timbers and Timber-measuring, | 7 |
| Horticulture, - - | 13 |
| Agricultural Chemistry, Junior Lectures, | 31 |
| Do. do., Senior Lectures, | 7 |
| Intermediate Chemistry, - | 13 |
| Book-keeping, - | 23 |
| Surveying, - - | 33 |
| Agricultural Law, - - | 10 |
| Do. Botany, | 8 |
| Total number of Individual Students in both Day and Evening Classes, | 236 |
| Total number of Enrolments in both Day and Evening Classes, | 675 |

DAIRY SCHOOL AT KILMARNOCK.

| | |
|-----------------------------------|---------|
| Number of Pupils (Session 1907), | 229 |
| Number of Attendances registered, | - 5,093 |

DAIRYING (1907).

THE COLLEGE DAIRY SCHOOL AT HOLMES FARM,
KILMARNOCK.

The Dairy School was open from 25th March till 27th September, and during that time courses of instruction were continued on the same lines as in former years, comprising regular daily instruction in Cheesemaking and Buttermaking.

Instruction was also given from time to time in the making of Stilton Cheese, Cream Cheese, and other soft cheeses.

The Special Lecture Courses intended to prepare pupils for Certificate and Diploma Examinations in Dairying were conducted as in previous years, the Junior for eight weeks in April and May, and the Senior for sixteen weeks in June, July, August, and September. A series of ten lectures on Poultry was included in the Junior Course, and one of twenty lectures in the Senior Course.

The total number of pupils enrolled during the session was 229. The average daily attendance was 31.6.

In the Special Classes 39 pupils enrolled for the Junior Course, and of these 14 gained the Certificate in Butter-making, and 17 the Junior Certificate in Dairying; 18 pupils enrolled for the Senior Course, of these 11 gained the Senior Certificate in Dairying; while 13 pupils subsequently succeeded in passing for the National Diploma in Dairying.

The Examiners for the Junior Certificate were :—

| | |
|---------------------------|--------------------------|
| Theory of Dairying, | Mr. Richard Henderson. |
| Milking and Buttermaking, | - Mr. William M'Fadzean. |
| Cheesemaking, | - Mr. Alex. Todd. |

The Examiners for the Senior Certificate were :—

| | |
|--------------------------------|------------------------|
| Theory of Dairying and Botany, | Mr. Richard Henderson. |
| Chemistry, - | - Dr. Henderson. |
| Bacteriology, | Dr. Peter Paterson. |
| Buttermaking, - | Mr. John Gilchrist. |
| Cheesemaking, | Mr. William M'Fadzean. |

ADVISORY AND ANALYTICAL DEPARTMENT.

During the course of the session advantage, in an increasing degree, was taken of the privileges offered by the College under this department, and a number of inquiries were made by farmers, to which replies were duly sent by members of the staff. Advice was thus given on manuring, on the relative feeding value of certain crops, on the treatment of crops suffering from insect attacks, diseases affecting live stock, and on other branches of agricultural management. Samples of grass seeds were examined for purity and germination, and a largely increased number of milk samples were sent in for determination of butter fat. Examinations were also made of feeding stuffs for composition and purity.

II.—EXTENSION WORK.

AGRICULTURAL EXPERIMENTS.

The experimental work of the College consisted of investigations into the manuring of the more important farm crops, the comparative merits of varieties of various crops, the destruction of weeds, the prevention of crop diseases, the feeding of farm stock, and other subjects. The experiments were carried out (*a*) at the Central Experiment Station, Holmes Farm; (*b*) on farms in the contributing counties. These latter were in part arranged by agreement with County Councils and Local Committees, and in part by direct communication with the farmers who conducted them.

Reports on the results of the experiments, written by Principal Wright, Professor M'Alpine, and Professor Berry, have been issued from time to time.

The following Bulletins and Reports, which have already been issued, can be had on application, by farmers residing within the contributing counties :—

SECOND ANNUAL REPORT

(1900 EXPERIMENTS).

BULLETIN 6.—“Report on Experiments on the Winter Fattening of Cattle,” by Professor Paterson.

BULLETIN 7.—“Report on Experiments on the Winter Fattening of Sheep,” by Professor Paterson.

BULLETIN 8.—“Report on Experiments on the Manuring of Ryegrass and Clover Hay,” by James Wood, M.A., B.Sc.

BULLETIN 9.—“Report on Experiments on the Manuring of Turnips,” by Professor Wright.

BULLETIN 10.—“Report on Rotation Experiment,” by Professor Paterson.

BULLETIN 11.—“Report on Experiments on the Manuring of Potatoes,” by Professor Wright.

BULLETIN 12.—“Report on Experiments on the Comparative Merits of Varieties of Oats,” by Professors Wright, M'Alpine, and Paterson.

THIRD ANNUAL REPORT

(1901 EXPERIMENTS).

- BULLETIN 13.—“Reports on (a) The Weather of 1901, (b) An Experiment on the Fattening of Cattle on Pasture,” by Professor Paterson.
- BULLETIN 14.—“Report on Experiments on the Manuring of Potatoes,” by Professor Wright.
- BULLETIN 15.—“Report on the Relative Effects of Superphosphate and Basic Slag upon the Feeding Quality of Swedes,” by Professor Paterson.
- BULLETIN 16.—“Report on Experiments on the Manuring of Turnips,” by Professor Wright.
- BULLETIN 17.—“Reports (a) On the Effects of Air and Soil Space on the Productiveness of Oats, (b) On the Effects produced on 13 Varieties of Oats by Top-dressings of Nitrate of Soda,” by Professor Wright.
- BULLETIN 18.—“Report on Experiments on the Comparative Merits of Varieties of Oats,” by Professor Wright.
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FOURTH AND FIFTH ANNUAL REPORTS

(1902 AND 1903 EXPERIMENTS).

- BULLETIN 19.—“Report on the Weather of 1902 and 1903,” by Professor Paterson.
- BULLETIN 20.—“Report on Experiments in Pots in 1902 on the Value of the Accessory Constituents of Artificial Manures,” by Professor Paterson.
- BULLETIN 21.—“Report on Experiments with Sugar Beet in 1902 and 1903,” by Professor Paterson.
- BULLETIN 22.—“Report on Experiments in 1901-03 on the Destruction of Runch and Charlock in the Oat Crop by Spraying,” by Professor Wright.
- BULLETIN 23.—“Report on the Relative Effects of Superphosphate and Basic Slag upon the Feeding Quality of Turnips,” by Professor Paterson.
- BULLETIN 24.—“Report on the Winter *versus* Spring Application of Manures to the Potato Crop,” by Professor Paterson.
- BULLETIN 25.—“Report on the Manuring of Turnips in 1902,” by Professor Wright.
- BULLETIN 26.—“Report on the Manuring of Potatoes in 1902,” by Professor Wright.
- BULLETIN 27.—“Report on Experiments on the Manuring of Ryegrass and Clover Hay in 1903,” by Professor Wright.
- BULLETIN 28.—“Report on Experiments on the Manuring of Turnips in 1903,” by Professor Wright.
- BULLETIN 29.—“Report on an Experiment on the Feeding of Dairy Cows,” by Mr. Robb.

SIXTH ANNUAL REPORT.

- BULLETIN 30.—“Reports on (a) The Weather of 1904, and on (b) Experiments with Sugar Beet,” by Professor Paterson.
- BULLETIN 31.—“Report on Experiments on the Seeding of Pastures, 1901-04,” by Professor M'Alpine.
- BULLETIN 32.—“Report on Experiments on the Improvement of Poor Permanent Pasture,” by Dr. Wilson, of Carbeth.
- BULLETIN 33.—“Report on Pot Experiments with Oats,” by Professor Paterson.
- BULLETIN 34.—“Report on Experiments with Potatoes—the best Size of Sets and the best Width of Planting,” by Professor Wright.
- BULLETIN 35.—“Report on an Experiment at Downan on the Improvement of Permanent Pasture,” by Professor Wright.
-

SEVENTH AND EIGHTH ANNUAL REPORTS.

- BULLETIN 36.—“Reports on (a) the Weather of 1905 ; (b) the Inoculation of Leguminous Crops ; and (c) Demonstration Experiments on Manuring of Potatoes and Turnips,” by Mr. Struthers.
- BULLETIN 37.—“Report on Experiments on the Manuring of Turnips in 1904 and 1905,” by Professor Wright.
- BULLETIN 38.—“Report on a Rotation Experiment,” by Professor Berry.
- BULLETIN 39.—“Report on Experiments on the Manuring of Hay in 1904 and 1905,” by Professor Wright.
-

NINTH ANNUAL REPORT.

- BULLETIN 40.—“Reports on (a) the Weather of 1906, and (b) Experiments with New Nitrogenous Manures,” by Professor Berry.
- BULLETIN 41.—“Reports on Experiments (1902-1906) on the Comparative Merits of Varieties of Oats.—Section I.—The Influence of Soils and Seasons,” by Professor Wright.
- BULLETIN 42.—“Reports of Experiments on the Manuring and Inoculation of the Bean Crop in 1905 and 1906,” by Professor Wright.
- BULLETIN 43.—“Reports on (a) an Experiment on the Effects of Planting Sprouted Tubers on the Yield of the Potato Crop, and (b) an Experiment with Seed Potatoes of English, Irish, and Scottish Growth,” by Professor Wright.
- BULLETIN 44.—“Report on the Milk Record of the Dairy School Herd,” by Mr. Speir Newton.
- BULLETIN 45.—“Report on Experiments in 1905 on Varieties of Oats—their Botanical Characters, and the Influence of Manures thereon ; Frame Experiments and Frame Crops,” by Professor M'Alpine.

A list of experiments carried out in the year 1907 is appended. The results of these experiments formed the basis of the Extension Lectures given by the College Staff during the past session in the contributing counties. These lectures were delivered by Principal Wright, Professors M'Alpine and Berry, and Messrs. Wm. G. R. Paterson, John Gillies, Wm. Stevenson, and John Brown.

AGRICULTURAL EXPERIMENTS

CONDUCTED IN 1907.

I. AT THE CENTRAL EXPERIMENT STATION, HOLMES FARM, KILMARNOCK.

1. On the Comparative Merits of about 150 Varieties of Oats.
2. On the Best Method of Liming Land.
3. On the Relative Efficacy of the New Nitrogenous Manures on Oats, Potatoes, Mangels, and Turnips.
4. On the Utilisation and Exhaustion of Farmyard Manure, and the Most Profitable System of Manuring for a Rotation of Crops.
5. On Various Methods of Destroying Charlock and Runch in the Oat Crop.
6. On the Seeding of Pastures.
7. On Means of Preventing "Finger and Toe" in Turnips.
8. On the Best Size of Potato Sets to Plant.
9. On the Best Widths at which to plant Potato Sets.
10. On Sprouted *v.* Unsprouted Potato "Sets."
11. On the Effects Produced on the Condition of the Land by the Growth of Clover and other Plants.
12. On the Manuring and Inoculation of Lucerne.
13. On the Manuring and Inoculation of Beans.
14. On the Sowing of Oats at Different Times.
15. On Thick and Thin Seeding of Oats.
16. Comparison of Clover grown from Seeds from Different Countries.
17. On the Utilisation of Calcium Nitrate as a Manure.
18. On Pig-feeding.
19. On the Utilisation of Calcium Cyanide as a Manure.
20. Comparison of Different Varieties of Swedes.
21. On the Growth of Kohl Rabi.
22. On Pig-feeding.

AGRICULTURAL EXPERIMENTS CONDUCTED THROUGHOUT
THE COUNTIES IN 1907.

| Name of Experiment. | By whom reported on. | No. of Farms. | Counties. |
|---|---|---------------|---|
| On the Manuring of Potatoes, | Prof. Wright, | 20 | Ayr, Dumfries, Dunbarton, Lanark, Perth, Renfrew, and Stirling. |
| On the Manuring of Turnips, | Do., | 28 | Argyll, Ayr, Arran, Dumfries, Kirkcudbright, Lanark, Perth, Renfrew, and Wigtown. |
| On the Comparative Merits of Varieties of Oats (Series A), | Profs. Wright and M'Alpine, | 19 | Argyll, Ayr, Dumfries, Lanark, Perth, Renfrew, and Stirling. |
| On the Comparative Merits of Varieties of Oats (Series B), | Do., | 19 | Ayr, Dunbarton, Dumfries, Lanark, Perth, Renfrew, and Stirling. |
| On the Manuring of Strawberries, | Prof. Wright, | 3 | Lanark, Perth, and Renfrew. |
| On the Improvement of Poor Pasture by Manuring, | Prof. Wright, Dr. Wilson, and Jas. Hendrick, B.Sc., F.I.C., | 5 | Lanark, Dumfries, Kirkcudbright, and Perth. |
| On the Improvement of Poor Pasture by Seeding and Manuring, | Profs. Wright and M'Alpine, | 6 | Argyll and Dumfries. |
| On the Utilisation of Sewage as a Pasture Manure, | Prof. Berry, | 1 | Dunbarton. |

LIST OF EXTENSION LECTURES ON EXPERIMENTS
DELIVERED DURING SESSION 1907-08.

| County and Place of Lecture. | Date. | Subject. | Lecturer. | Attendance. | Total for County. |
|------------------------------|------------------|-----------------------------------|------------------|-------------|-------------------|
| ARGYLLSHIRE— | | | | | |
| Oban | 1907. Oct. 29 | Measurement of Standing Timber | Mr. Hudson | 33 | |
| Southend | Dec. 16 | General Principles of Dairying | Mr. M'Cutcheon | 60 | |
| Lochgoilhead | 1908. Jan. 8 | Prevention of Finger-and-Toe | Mr. Paterson | 35 | |
| Strachur | ,, 9 | Seeding of Pastures - | Do. | 7 | |
| Kilmun | ,, 10 | Experiments on Potatoes | Do. | 16 | |
| Millhouse | ,, 17 | Do. | Do. | 32 | |
| Glendaruel | ,, 17 | Manuring of Turnips | Do. | 8 | |
| Toward and Innellan | ,, 23 | Milk and Milk Records | Do. | 14 | |
| Kilmartin | Mar. 6 | Experiments on Potatoes | Do. | 25 | |
| | | | | | 230 |
| AYRSHIRE— | | | | | |
| Kilmarnock | 1907. Nov. 21 | Ups and Downs of Plant Life | Prof. M'Alpine | 210 | |
| Greenhills | 1908. Jan. 9 | Feeding of Calves | Mr. Gillies | 20 | |
| Muirkirk | ,, 10 | Improvement of Poor Pasture | Principal Wright | 31 | |
| New Cumnock | ,, 13 | Destruction of Runch and Charlock | Mr. Gillies | 22 | |
| New Cumnock | ,, 27 | Milk Records - | Mr. Stevenson - | 36 | |
| Ballantrae | ,, 31 | Holdings Acts - | Mr. Brown | 32 | |
| Dalrymple | ,, 31 | Milk and Milk Records | Mr. Stevenson - | 17 | |
| <i>Carry forward, -</i> | | | | 368 | 230 |

LIST OF EXTENSION LECTURES—*Continued.*

| County and Place of Lecture. | Date. | Subject. | Lecturer. | Attend- ance. | Total for County. |
|------------------------------|-----------------|-------------------------|----------------|------------------|-------------------------|
| AYRSHIRE— <i>Contd.</i> | | <i>Brought forward,</i> | <i>-</i> | 368 | 230 |
| Dailly | 1908. Feb. 5 | Manuring of Turnips | Mr. Brown | 13 | |
| Barr | „ 7 | Buttermaking | Mr. Stevenson | 56 | |
| New Cumnock | „ 10 | Finger-and-Toe | Mr. Paterson | 38 | |
| Dalry | „ 12 | Seeding of Pastures | Mr. Brown | 28 | |
| Dundonald | „ 12 | Varieties of Oats | Prof. M'Alpine | 29 | |
| Cumnock | „ 13 | Cheesemaking | Mr. Stevenson | 26 | |
| Ballantrae | „ 14 | Manuring for a Rotation | Do. | 25 | |
| Dunlop | „ 14 | Seeding of Pastures | Prof. M'Alpine | 25 | |
| Mauchline | „ 19 | Finger-and-Toe | Mr. Paterson | 30 | |
| Auchinleck | „ 20 | Seeding of Pastures | Do. | 40 | |
| Dailly | „ 21 | Cheesemaking | Mr. Stevenson | 12 | |
| Barr | „ 21 | Varieties of Oats | Prof. M'Alpine | 18 | |
| New Cumnock | „ 24 | Feeding of Pigs | Mr. Johnston | 20 | |
| Dundonald | „ 26 | Potato Experiments | Mr. Paterson | 28 | |
| Ballantrae | „ 28 | Finger-and-Toe | Mr. Paterson | 9 | |
| Dalry | Mar. 4 | Varieties of Oats | Prof. M'Alpine | 47 | |
| Barrhill | „ 6 | Milk Records | Mr. Stevenson | 13 | |
| Ballantrae | „ 16 | Feeding of Calves | Mr. Paterson | 45 | |
| | | <i>Carry forward,</i> | | | 870 |
| | | | | | 1,100 |

LIST OF EXTENSION LECTURES—*Continued.*

| County and Place of Lecture. | Date. | Subject. | Lecturer. | Attend- ance. | Total for County. |
|------------------------------|---------|----------------------------------|------------------|------------------|-------------------------|
| DUNBARTONSHIRE— | | <i>Brought forward, - -</i> | | | 1,100 |
| | 1908. | | | | |
| Gartocharn | Jan. 14 | New Nitrogenous Manures | Mr. Brown | 49 | |
| Cardross | „ 14 | Milk Records - | Mr. Stevenson | 36 | |
| Gartocharn | „ 21 | Milk and Milk Records | Do. | 48 | |
| Condorrat | „ 22 | Milk and Milk Records | Do. | 43 | |
| Cardross | „ 27 | Plants and their Modes of Living | Prof. M'Alpine | 35 | |
| Cardross | „ 28 | Varieties of Oats | Principal Wright | 40 | |
| Gartocharn | „ 28 | Poultry | Miss Speir | 86 | |
| Condorrat | Feb. 5 | Experiment on Potatoes | Mr. Paterson | 30 | |
| Cardross | „ 11 | Potato Manuring | Do. | 36 | |
| Gartocharn | „ 11 | Manuring for a Rotation | Prof. Berry | 50 | |
| Condorrat | „ 19 | Varieties of Oats | Prof. M'Alpine | 18 | |
| Cardross | „ 24 | Seeding of Pastures - | Do. | 20 | |
| Condorrat | Mar. 4 | New Nitrogenous Manures | Mr. Paterson | 30 | 521 |
| KIRKCUDBRIGHTSHIRE— | | | | | |
| | 1908. | | | | |
| Creebridge | Feb. 24 | Manuring for a Rotation | Do. | 32 | 32 |
| LANARKSHIRE— | | | | | |
| | 1907. | | | | |
| Sandford | Oct. 21 | Grasses and Pastures | Prof. M'Alpine | 30 | |
| Sandford | Nov. 4 | Manuring of Turnips | Mr. John Brown | 37 | |
| Sandford | „ 18 | Poultry Keeping | Miss Speir | 63 | |
| | | <i>Carry forward, - -</i> | | 130 | 1,653 |

LIST OF EXTENSION LECTURES—*Continued.*

| County and Place of Lecture. | Date. | Subject. | Lecturer. | Attendance. | Total for County. |
|------------------------------|---------|------------------------------------|------------------|-------------|-------------------|
| LANARKSHIRE— | 1907. | <i>Brought forward, - -</i> | | 130 | 1,653 |
| Sandford | Dec. 2 | Diseases of Turnips - | Prof. M'Alpine | 28 | |
| Sandford | „ 13 | Cheesemaking | Mr. Stevenson - | 52 | |
| Uddingston | Jan. 21 | How Plants obtain their Livelihood | Prof. M'Alpine | 85 | |
| Hamilton | Feb. 6 | Ups and Downs of Plant Life | Do. | 100 | |
| Gilmourton | „ 26 | Poultry | Miss Speir | 102 | 497 |
| PERTHSHIRE— | | | | | |
| Muthill | „ 28 | Seeding of Pastures - | Mr. Stevenson - | 16 | |
| Madderty | Mar. 13 | Varieties of Oats | Prof. M'Alpine | 21 | 37 |
| RENFREWSHIRE— | 1907. | | | | |
| Eaglesham | Nov. 29 | Milk and Milk Records | Mr. Stevenson - | 25 | |
| Eaglesham | Dec. 13 | Grasses and Pastures | Prof. M'Alpine | 18 | |
| Eaglesham | Jan. 14 | Varieties of Oats | Principal Wright | 21 | |
| Neilston | „ 22 | Improvement of Poor Pasture | Mr. Paterson | 50 | |
| Eaglesham | „ 24 | Manuring of Potatoes | Mr. Gillies | 14 | |
| Inverkip | „ 29 | Milk and Milk Records | Mr. Stevenson - | 62 | |
| Inverkip | Feb. 12 | Finger-and-Toe | Mr. Paterson | 60 | |
| Neilston | „ 21 | Manuring of Turnips | Do. | 45 | |
| Inverkip | „ 26 | Seeding of Pastures - | Prof. M'Alpine | 60 | 355 |
| | | <i>Carry forward, - -</i> | | | 2,542 |

LIST OF EXTENSION LECTURES—*Continued.*

| County and Place of Lecture. | Date. | Subject. | Lecturer. | Attend- ance. | Total for County. |
|------------------------------|------------------|--------------------------------------|----------------|------------------|-------------------------|
| STIRLINGSHIRE— | | <i>Brought forward,</i> | - | | 2,542 |
| Denny | 1907. Dec. 6 | Grasses and Pastures | Prof. M'Alpine | 22 | |
| Denny | ,, 20 | Milk and Milk Records | Mr. Stevenson | 12 | |
| Denny | 1908. Jan. 10 | New Nitrogenous Manures | Prof. Berry | 19 | |
| Buchanan | ,, 14 | Forestry - | Mr. Hudson | 78 | |
| Kippen | ,, 30 | Feeding of Calves | Mr. Paterson | 18 | |
| Buchlyvie | Feb. 7 | Farmyard Manure | Mr. Brown | 30 | |
| Kippen | ,, 13 | Agricultural Hold- ings Acts | Do. | 27 | |
| Buchlyvie | ,, 14 | Nitrogenous Manures | Mr. Paterson | 20 | |
| Buchlyvie | ,, 21 | Potassic and Phos- phatic Manures | Mr. Brown | 35 | |
| Kippen | ,, 27 | Feeding of Dairy Cows | Mr. Paterson | 22 | |
| Buchlyvie | Mar. 2 | Seeding of Pastures - | Mr. Brown | 30 | |
| Buchlyvie | ,, 9 | Feeding of Dairy Cows | Mr. Paterson | 32 | |
| Kippen | ,, 12 | Potato Experiments - | Mr. Johnston | 18 | |
| | | | | | 363 |
| WIGTOWNSHIRE— | | | | | |
| Drummore | 1907. Nov. 1 | Finger-and-Toe | Mr. Paterson | 20 | |
| Drummore | ,, 15 | Milk and Milk Records | Mr. Stevenson | 33 | |
| Drummore | ,, 29 | Seeding of Pastures - | Prof. M'Alpine | 25 | |
| Drummore | Dec. 13 | Lime and Liming - | Mr. Paterson | 20 | |
| | | | | | 98 |
| | | Total Attendances, | - | | 3,003 |

EXTENSION WORK.

By arrangement with the County Councils or other Local Authorities continuous classes have been held in the following places:—

| Counties and Centres. | Subjects. | Lecturers. | No. of Meetings. | Total Attendances. |
|-----------------------|-----------------------------------|-----------------------------|------------------|--------------------|
| ARGYLLSHIRE— | | | | |
| Oban . . . | Agriculture - | Mr. Paterson - | 9 | 235 |
| Southend . . . | Do. | Mr. M'Cutcheon | 10 | 500 |
| AYRSHIRE— | | | | |
| Dunlop . . . | Do. | Mr. Johnstone - | 10 | 120 |
| DUMBARTONSHIRE— | | | | |
| Dumbarton . . . | Forestry | Mr. Hudson - | 4 | 142 |
| DUMFRIESSHIRE— | | | | |
| Johnstone Bridge . | Agriculture (4) and Poultry (1) - | Mr. Paterson and Miss Speir | 5 | 237 |
| Moniaive . . . | Agriculture - | Mr. M'Cutcheon | 6 | 450 |
| Dumfries . . . | Forestry | Mr. Hudson - | 5 | 186 |
| KIRKCUDBRIGHT-SHIRE— | | | | |
| Kirkgunzeon . . . | Agriculture - | Mr. Stevenson - | 10 | 373 |
| Shawhead . . . | Do. | Do. | 10 | 226 |
| Terregles . . . | Do. | Do. | 10 | 112 |
| Auchencairn . . . | Do. | Do. | 10 | 276 |
| Harrogate . . . | Do. | Do. | 10 | 272 |
| Dundrennan . . . | Do. | Do. | 10 | 319 |
| Ringford . . . | Do. | Mr. Gillies - | 10 | 286 |
| Gatehouse . . . | Do. | Do. | 10 | 178 |
| Borgue . . . | Do. | Do. | 10 | 130 |

| Counties and Centres. | Subjects. | Lecturers. | No. of Meetings. | Total Attendances. |
|-----------------------|---------------|--|------------------|--------------------|
| LANARKSHIRE— | | | | |
| Strathaven - | Agriculture - | Mr. M'Cutcheon | 20 | 400 |
| Larkhall - | Do. | Do. | 20 | 360 |
| Lesmahagow - | Do. | Do. | 21 | 525 |
| Do. | Do. | Mr. Gillies | 20 | 100 |
| Douglas - | Forestry - | Prof. M'Alpine, Messrs. Hudson, Paterson, and Gillies | 4 | 72 |
| Biggar - | Do. | Prof. M'Alpine & Mr. Hudson | 4 | 25 |
| STIRLINGSHIRE— | | | | |
| Killlearn - | Do. | Mr. Hudson | 5 | 113 |
| | | Totals, | 233 | 5637 |

DAIRY EXTENSION WORK.

By arrangement with County Associations Mr. John P. Hunter, N.D.D., gave instruction in Cheese-making and advice to Cheesemakers in Ayrshire, Dumfriesshire, and Kirkcudbrightshire.

AYRSHIRE.—Demonstrations were made and instruction given in Cheese-making at 53 centres. 263 visits were made to dairies.

DUMFRIESSHIRE.—Demonstrations were made and instruction given in Cheese-making at 12 centres. Average attendance, 10. Visiting dairies, 12 days.

KIRKCUDBRIGHTSHIRE.—Demonstrations were made and instruction given in Cheese-making at 15 centres. 288 visits were made to dairies.

DEMONSTRATIONS AT COLLEGE EXPERIMENT STATION
IN 1907.

| Date. | Audience. | Subject. | Demonstrators. | Attendances. |
|---------|------------------------------------|---------------|----------------|--------------|
| June 1 | Opening Demonstration | Demonstration | Staff, | 75 |
| " 8 | Lesmahagow Farmers' Society | Plots and Ex- | Do., | 17 |
| " 22 | Dumbartonshire Farmers' Socy. | periments at | Do., | 10 |
| " " | Uddingston Ramblers | Station, | Do., | 34 |
| " " | Kilmarnock Sons of Temper- | Do., | Do., | 36 |
| | ance | | | |
| " 25 | Fenwick Farmers' Society and | Do., | Do., | 70 |
| | Colonial Visitors | | | |
| | Other Visitors during June | Do., | Do., | 21 |
| July 6 | Public Demonstration | Do., | Do., | 53 |
| " " | Seed Trade Assistants' Asso- | Do., | Do., | 8 |
| | ciation, Glasgow | | | |
| " 11 | Islay Farmers | Do., | Do., | 41 |
| " 12 | Party of Swedes | Do., | Do., | 11 |
| " 13 | Kilmarnock Cage Bird | Do., | Do., | 24 |
| | Fanciers' Association | | | |
| " 26 | Sanquhar Farmers' Society | Do., | Do., | 13 |
| " " | Stirling County Council | Do., | Do., | 7 |
| | Other Visitors during July, in- | Do., | Do., | 25 |
| | cluding German and Canadian | | | |
| Aug. 2 | Stewartry Farmers' Club | Do., | Do., | 38 |
| " 3 | Public Demonstration, includ- | Do., | Do., | 80 |
| | ing Old Monkland Society | | | |
| " 10 | Rhins of Galloway Farmers' Society | Do., | Do., | 34 |
| " 14 | Campbeltown Farmers | Do., | Do., | 11 |
| " 17 | Dumbartonshire Society | Do., | Do., | 20 |
| " 20 | Cumbernauld and Dunblane Societies | Do., | Do., | 50 |
| " 29 | Major Craufurd and Party | Do., | Do., | 5 |
| " 31 | Visitors and small Parties | Do., | Do., | 14 |
| Sept. 7 | Public Demonstration | Do., | Do., | 44 |
| " " | M'Kean and Party, &c. | Do., | Do., | 8 |
| " 27 | Dr. Douglas, Canadian Party, &c. | Do., | Do., | 4 |
| Oct. 7 | Bentinck Higher Grade School | Do., | Do., | 25 |
| | Other Visitors during Septem- | Do., | Do., | 9 |
| | ber and October | | | |
| | | | Total, | 787 |

LIST OF STUDENTS WHO GAINED PRIZES.

WINTER SESSION 1907-1908.

AGRICULTURE—

Senior Day Class.—

1. Thomas Limond.
2. Peter A. M'William.
3. John Dunlop.

Intermediate (Soils and Manures).—

1. William Lawson.
2. William Fife.
3. Alexander Allan.

Senior Evening Class.—

1. John Kincaid.
2. John Muirhead.
3. A. Cullen Brown.

Junior Evening Class.—

1. A. Ewing Reid.
2. James Porteous.
3. C. Cameron Douglas, } equal.
Joseph Murray,

BOTANY.—

Senior Day Class (Theoretical).—

1. Daniel O'Brien.
2. Onig Balabanian.
3. William Strang, } equal.
William Lawson,

Senior Day Class (Practical).—

1. Daniel O'Brien, } equal.
William Strang,
3. Onig Balabanian.

Junior Day Class (Theoretical).—

1. John M'D. Young.
2. James Stevens.
3. James Kay.

Ladies.—

1. Miss Shiell.
2. Miss Simpson.

Junior Botany (Practical).—

1. John M'D. Young, } equal.
William Fife,
3. Joseph Murray.

Ladies.—

1. Miss Davidson.
2. Miss Simpson.

Evening Class.—

1. Miss C. Arthur.
2. David B. Kerr.
3. J. M'Meikin.

FORESTRY.—

Day Class.—

1. James Kay.
2. Thomas Limond.

*Evening Classes.**Forestry, 1st Year.*—

1. Joseph Greer, } equal.
- Thomas Moffat, }

Forestry, 2nd Year.—

1. Marshall L. Wilson.
2. James M'Niven, } equal.
- James Robertson, }

Timbers and Timber-Measuring.—

1. John M'D. Young.
2. James M'Dougall.

HORTICULTURE.—

1. John M'Meikin.
2. P. Fenton.

CHEMISTRY.—

Agricultural Chemistry, Day Class (Theoretical).—

1. Renwick Leitch.
2. John Dunlop.
3. Peter A. M'William.

Agricultural Chemistry, Day Class (Practical).—

1. John Dunlop.
2. Peter A. M'William.
3. Renwick Leitch.

Junior Day Class (Theoretical).—

1. William Fife.
2. John M'D. Young.
3. James Stevens.

Junior Day Class (Practical).—

1. Joseph Murray, } equal.
- James Stevens, }
2. John M'D. Young.

Senior Evening Class.—

1. R. Gardner, } equal.
- A. D. O. M'Kinnon, }

PRIZE LIST.

Intermediate Evening Class (Theoretical).—

1. Daniel O'Brien.
2. William Strang.
3. James M. Brown.

Intermediate Evening Class (Practical).—

1. William Strang, } equal.
Daniel O'Brien, }
3. William Lawson.

Junior Evening Class.—

1. James Porteous.
2. James Stewart.
3. Christina Arthur.

DAIRYING.—

1. John Dunlop.
2. Peter A. M'William.
3. Wilfred G. Sandeman.

BACTERIOLOGY.—

1. Wilfred G. Sandeman.
2. Peter A. M'William.
3. Hector A. Shaw.

AGRICULTURAL ZOOLOGY.—

1. Onig Balabanian, } equal.
William Lawson, }
3. William Strang, } equal.
Jeanie Currie, }

VETERINARY SCIENCE.—

1. Hector A. Shaw.
2. Margaret Sheill.
3. William Lawson.

AGRICULTURAL ENGINEERING.—

1. John Dunlop, } equal.
Renwick H. Leitch, }
3. Peter A. M'William.

BOOK-KEEPING.—

1. John Dunlop.
2. William Fife.
3. Peter A. M'William, } equal.
James Stevens, }

SURVEYING.—

1. William Lawson.
2. John Faichney.
3. M. S. Moody Stuart.

AGRICULTURAL LAW.—

1. R. H. Weddell, } equal.
John K. M'Millan, }
3. J. A. Malcolm.

ESSAY ON "FARM EXCURSIONS."—

1. Thomas Limond.

SPECIALS.—

Note-Book Prize (Junior Botany).—

1. James G. M'Nally.

Note-Book Prize (Senior Botany).—

1. George S. Scott.

Gold Medal (Agricultural Engineering).—

R. H. Leitch.

FARMERS' CLASS.—

First-class Certificates.—

| | |
|--------------|---------------|
| W. Milvain. | J. Mason. |
| S. Barr. | J. Garven. |
| A. Ross. | H. Steven. |
| R. Andrew. | G. C. Allan. |
| W. Paton. | A. Stevenson. |
| W. Gemmill. | M. Alexander. |
| H. Marshall. | J. Lambie. |
| W. Hosie. | R. A. Turcan. |
| J. Craig. | A. Thomson. |
| T. Hunter. | |

WINTER COURSE IN DAIRYING.—

First-class Certificates.—

| | |
|-------------------|----------------------|
| Andrew L. Lawson. | Nellie Hendry. |
| Pearson Hewitson. | Susan Jack. |
| Maggie Sillars. | Elizabeth Ferguson. |
| Janet Reid. | Maggie Lamont. |
| James Douglas. | Jeanie Martin. |
| James Crawford. | Mary Yuille. |
| William Taylor. | Jeanie Lamont. |
| Mary Wilson. | Isa Steven. |
| Robt. John Owens. | Jeanie Reid. |
| Jane Millar. | Agnes Alexander. |
| Agnes Barr. | Archibald Mackenzie. |
| Henry Cowan. | Jessie Davidson. |
| Janet Lawson. | |

POULTRY DEPARTMENT.—

*Special Summer Course.—**Certificates awarded.—*

Miss Irons. Miss Bagnall.

WINNERS OF BURSARIES.

Tenable at the College.

| | |
|-----------------------|-------------------------|
| A. Ewing Reid, £5. | C. Cameron Douglas, £5. |
| James Porteous, £5. | Joseph Murray, £5. |
| Christina Arthur, £5. | |

Tenable at the College and the University.

| | |
|--------------------------------|-----------------------------|
| Daniel G. O'Brien, £40 (1906). | William Strang, £35 (1907). |
|--------------------------------|-----------------------------|

LIST OF PUPILS WHO HAVE GAINED CERTIFICATES
AT THE DAIRY SCHOOL.

SUMMER SESSION 1907.

JUNIOR CERTIFICATE IN DAIRYING.

| | |
|---------------------|----------------------|
| Richard Brown. | John G. Lucas. |
| James W. A. Common. | Elspeth M. Martin. |
| Nellie Davis. | Jeanie Morrison. |
| J. Findlay. | Matthew G. Morrison. |
| Minnie Gilmour. | Mary M'Kerrow. |
| Ella Gow. | William Paterson. |
| Reginald Grant. | May Simson. |

BUTTERMAKING CERTIFICATE.

| | |
|--------------------|-------------------|
| Agnes Bannatyne. | Lizzie Lawson. |
| M. Cowan. | Mrs. Porteous. |
| Bessie Fleming. | Jeanie Templeton. |
| Jeanie F. Fleming. | Mary Wallace. |

SENIOR CERTIFICATE IN DAIRYING.

| | |
|---------------------|--------------------|
| Thomas Carruthers. | Elspeth M. Martin. |
| James W. A. Common. | Jeanie Morrison. |
| Jeanie Currie. | William Paterson. |
| Nellie Davies. | William Paton. |
| Reginald Grant. | Mary M'Kerrow. |
| Margaretta Irons. | Margaret Shiell. |
| John H. Loutit. | May Simson. |
| John G. Lucas. | Ella Stevenson. |

NATIONAL DIPLOMA IN DAIRYING.

| | |
|--------------------------|--------------------------|
| Gwen Bagnall. | Margaretta Irons. |
| James M'C. Brown. | Winifred E. Love. |
| Thomas R. D. Carruthers. | John G. Lucas. |
| Alexander F. Cumming. | Elspeth M. Martin. |
| Jeanie Currie. | Jeanie Morrison. |
| William M. Denny. | Mary M'Kerrow. |
| Constance M. Emmerson. | Allister Ogilvy. |
| James P. Gow. | William Paterson. |
| Reginald Grant. | William Paton. |
| William Hunter. | Alexander V. D. Rintoul. |
| Ella Stevenson. | |

DISTINCTIONS GAINED BY PAST OR PRESENT
STUDENTS OF THE COLLEGE.*

B.Sc., Glasgow—

James Bradshaw, Edward Porter, Alexander Graham (1902)
John Porter (1903); John Struthers, M.A. (1904); Neil Leitch,
Alexander B. Lamont, M.A., William G. R. Paterson,
Robert D. Watt, M.A. (1905); Wm. Stevenson (1906); John
Brown, J. Hunter Smith (1907); John Dunlop, Renwick H.
Leitch, M.A. (1908).

National Diploma in Agriculture—

J. M. Hattrick, Thomas Young, Jun. (1901); James Bradshaw,
G. S. Henderson, Edward Porter (1902); John Porter (1903);
John Struthers (1904); Robert D. Watt (Medal and Honours),
Neil Leitch (Honours), William G. R. Paterson (Honours),
Archibald Wilson (1905); James Wyllie (Honours); James
Johnstone, Wm. Stevenson (1906); Jas. Mackintosh (Honours,
1st place), John Brown, Allan Carruth, John Gillies, T. E.
Bayne Jardine, J. Hunter Smith (1907); John Dunlop
(Honours, 1st place); Renwick H. Leitch (Honours); Thomas
Limond, Peter A. M'William (1908).

Science and Art Honours in Agriculture—

Edward Porter (1902).

Fellowship of the Highland and Agricultural Society of Scotland—

R. A. Allan, James L. Howie, Andrew R. Robertson, James Cole,
Warburton C. Jardine, William Galloway, J. M. Hattrick.

* Prior to the year 1899 the Agricultural Department of the Glasgow and West of Scotland Technical College.

Forestry Certificate of the Highland and Agricultural Society—

Allan Carruth (1905); Donald Ferguson (1906).

Certificate of the Royal Agricultural Society of England—

Warburton C. Jardine.

Fellowship of Surveyors' Institution—

William Fraser, T. R. Canch (1903).

Professional Associateship of Surveyors' Institution—

T. R. Canch (1902); B. Leslie Emslie, G. S. Henderson, H. C. Holland, N. M. Kerr (1903); R. F. Brebner, J. S. J. M'Call (1904); William Blair, Allan Carruth, J. V. Makins (1905); Donald Ferguson, Wm. Limond, E. N. Harvie (1906); *James Johnstone, John Morrison Leggat, Joseph Train Paton, James Young (1907); A. D. O. Mackinnon, R. H. Weddell (1908).

WINNERS OF THE DIPLOMA IN AGRICULTURE OF THE COLLEGE.

George L. Macfarlane (1902); B. Leslie Emslie (1903); J. Stewart M'Call, Wm. D. Simpson (1904); A. Carruth, J. Gillies, J. Wyllie, J. Gow (Associateship) (1906); T. E. Bayne Jardine, James Mackintosh, J. H. Ronaldson (Associateship) (1907); Thomas Limond, Peter A. M'William, W. G. Sandeman, A. Y. Allan (Associateship) (1908).

WINNERS OF THE DIPLOMA IN DAIRYING OF THE COLLEGE.

Thomas Limond, Peter A. M'William, W. G. Sandeman (1908).

SILVER MEDAL AND DIPLOMA OF THE BRITISH DAIRY FARMERS' ASSOCIATION.

J. W. Dunlop, J. Struthers (1903); M. T. Dougall (1905).

NATIONAL DIPLOMA IN DAIRYING.

| | |
|-------------------------------------|-----------------------------------|
| John H. Donald, Ayrshire (1897). | Wilson M'Master, Wigtownshire. |
| Agnes S. Morton, Perthshire. | John G. M'Millan, Kirkcudbright. |
| Daniel K. Robb, Ayrshire. | John Marchbank, Lanarkshire. |
| Agnes W. Speir, Lanarkshire. | Isabella M. Montgomery, Ayrshire. |
| Geo. S. Thomson, Perthshire. | John O'Neil, Lancashire. |
| Matthew Wallace, Ayrshire. | John Steven, Ayrshire. |
| John Weir, Argyllshire. | Allan Stevenson, Ayrshire. |
| S. S. Anderson, Lanarkshire (1898). | Ellen Wright, Ayrshire. |
| Janet Campbell, Glasgow. | James L. Howie, Dunbartonshire. |
| Jeanie Carruthers, Lanarkshire. | C. D. Fleming, L'rkshire (1899). |
| Thomas Harrison, Wiltshire. | Wm. Limmond, Wigtownshire. |
| John Leslie, Aberdeen. | Mary M'Donald, Inverness. |

* Scottish Committee Prize of £10 10s. for Best Scotch Student.

- William Stevenson, Ayrshire.
 Bessie L. Wilson, Ayrshire.
 Jane Barbour, Fifeshire (1900).
 John Donald, Stirlingshire.
 Agnes Kinross, Fifeshire.
 Jemima A. Veitch, Lanarkshire.
 P. Wilkinson, Huntingdonshire.
 B.M. Macara, Lancashire (1901).
 C. E. B. Thomson, Aberdeenshire.
 Nellie M. Bennet, Stirling (1902).
 J. W. Dunlop, Ayrshire.
 Susan G. Fingland, Lanarkshire.
 Patrick Fowle, Aberdeenshire.
 G. S. Henderson, Ayrshire.
 Norah Musgrave, Middlesex.
 Jenny H. Reid, Ayrshire.
 Mary M. Rollo, Fifeshire.
 Annie C. Speir, Lanarkshire.
 Janet Strang, Fifeshire.
 Ella Street, Hants.
 R. D. Watt, Ayrshire.
 S. Alker, Lancashire (1903).
 Florence J. Clarke, D'bartonshire.
 Robert Forbes, Elginshire.
 John P. Hunter, Wigtownshire.
 Tibbie Laidlaw, Glasgow.
 Cath. C. Macintyre, Argyllshire.
 James G. Stewart, Banffshire.
 Edith Tress, Glasgow.
 Wm. B. Thompson, Cumberland.
 Wm. G. M'Cleary, Dumfriesshire.
 J. Struthers, Lanarkshire.
 F. Billington, Cheshire (1904).
 Wm. Bywater, Yorkshire.
 Jas. K. Earle, Durham.
 John Earle, do.
 R. C. Gaut, Yorkshire.
 Bessie R. Kirkwood, Ayrshire.
 Janet Macnaughton, Perthshire.
 Wilfred E. Smith, Edinburgh.
 Jeanie W. A. Speir, Lanarkshire.
 Hugh Stirling, Glasgow.
 Robt. M. Wilson, Berwickshire.
 John Anderson, Caithness (1905).
 Allan Carruth, Renfrewshire.
 Bernard F. Davis, Nottingham.
 Mary H. Dott, Fifeshire.
 Ella Wyllie Stevenson, Ayrshire.
 John Gillies, Lanarkshire.
 John H. Wyllie, Ayrshire.
 Peter A. M'William, Wigtownshire.
 Erasto A. Marino, Buenos Ayres.
 George E. Steward, Lancashire.
 Jeanie Strang, Fifeshire.
 Robert G. White, York.
 M. A. Wood, East Lothian.
 James Woodburn, Ayrshire.
 William Lawson, Lanarkshire.
 Horace N. Clarke, D'bartonshire.
 E. L. Henderson, Dumfriesshire.
 E. M. Todd, Edinburgh.
 Edith Anderson, F'farshire (1906).
 John Anderson, Dumfriesshire.
 John Cochran, Dumfriesshire.
 Cath. M. Dallas, Edinburgh.
 John Dunlop, Forfarshire.
 Margt. T. Dougall, Stirlingshire.
 Mary Finlayson, Ross-shire.
 Lillas Lees, Ayrshire.
 Thos. Limond, Ayrshire.
 Jas. Mackintosh, Perthshire.
 Grace Robertson, Glasgow.
 W. E. Sandeman, D'bartonshire.
 J. Hunter Smith, Ayrshire.
 Lily Strang, Lanarkshire.
 Gwen Bagnall, Bedfordshire (1907).
 Jas. M'Culloch Brown, Ayrshire.
 Thos. R. D. Carruthers, Edinburgh.
 Alexr. F. Cumming, Banffshire.
 Jeanie Currie, Glasgow.
 William M. Denny, D'bartonshire.
 C. M. Emmerson, Bedfordshire.
 James P. Gow, Ayrshire.
 Reginald Grant, Monmouthshire.
 William Hunter, Wigtownshire.
 Margaretta A. Irons, Forfarshire.
 Winifred E. Love, Bedfordshire.
 John Goodwin Lucas, Glasgow.
 Mary Jane M'Kerrow, Ayrshire.
 Elspeth May Martin, Glasgow.
 Jeanie Morrison, Perthshire.
 Allister Ogilvy, Roxburghshire.
 William Paterson, Glasgow.
 William Paton, Ayrshire.
 Alexander V. D. Rintoul, Kent.

**SOME APPOINTMENTS WHICH HAVE BEEN GAINED BY
STUDENTS AND FORMER MEMBERS OF THE STAFF
OF THE COLLEGE.**

- John R. Campbell, B.Sc., F.H.A.S., M.R.A.S.E., Lecturer on Agriculture, Harris Institute, Preston; Professor of Agriculture, Yorkshire College, Leeds; Assistant Secretary to the Department of Agriculture and Technical Instruction for Ireland.
- J. Frank Blackshaw, N.D.D., Principal of the Midland Dairy Institute, Kingston, Derby.
- R. S. Seton, B.Sc., Professor of Agriculture, Downton Agricultural College; Lecturer on Agriculture, Harris Institute, Preston; Professor of Agriculture, The University, Leeds.
- James L. Duncan, B.Sc., Lecturer, Department of Agriculture and Technical Instruction, Ireland.
- James Wood, M.A., B.Sc., F.H.A.S., Inspector under the Department of Agriculture and Technical Instruction, Ireland.
- R. A. Allan, F.H.A.S., Factor, Polkemmet; Governor of East of Scotland Agricultural College.
- G. S. Thomson, N.D.D., Dairy Expert to the Government of South Australia; Dairy Expert to Government of Queensland.
- Matthew Wallace, N.D.D., Butter Inspector, Department of Agriculture, Melbourne; Instructor in Dairying under the County Council of Hampshire.
- Douglas A. Gilchrist, B.Sc., Lecturer on Agriculture and Dairying in University College, Bangor; Lecturer on Agriculture and Dairying, The College, Reading; Professor of Agriculture, Armstrong College of Science, Newcastle-on-Tyne.
- James L. Hendrick, B.Sc., F.I.C., Lecturer on Agricultural Chemistry, Aberdeen University; Chemist to the Highland and Agricultural Society.
- And. R. Robertson, F.H.A.S., Technical Assistant, Department of Agriculture, Ireland.
- William M'Fadzean, Dairy Instructor, Cheddar Cheese Department, Midland Dairy Institute.
- Henry M'Fadzean, Dairy Instructor, Wigtownshire County Council.
- Bessie L. Brown, N.D.D., Instructress in Dairying, University College, Aberystwyth.
- Martha Brown, N.D.D., Instructress in Poultry-keeping under the Lancashire County Council.
- J. M. Hattrick, N.D.A., F.H.A.S., Representative in Australia of The Stassfurt Potash Syndicate.
- George G. Esslemont, B.Sc., Lecturer on Agriculture in Ross and Cromarty for the North of Scotland Agricultural College.

- John Struthers, M.A., B.Sc., N.D.A., N.D.D., Lecturer on Agriculture and Chemistry, West of Scotland Agricultural College; Secretary and Agricultural Chemist in Japan to the Asociación Salitrera.
- John Donald, N.D.D., Omagh Co-operative Dairy Society, Ireland.
- Wilson M'Master, N.D.D., Fowler Bros., Produce Merchants, London.
- Patrick Fowlie, N.D.D., Mooi River Creamery, Natal.
- Janet Strang, N.D.D., Instructress, North of Scotland Agricultural College.
- Mrs. Tress, N.D.D., Sterilised Milk Depot of Glasgow Corporation.
- M. A. Wood, N.D.D., Bangour Asylum, Midlothian.
- James Woodburn, N.D.D., Cheddar Cheese Manager, Huntley Creamery Co.
- Wm. Lawson, N.D.D., Assistant, Dairy School, Kilmarnock; Instructor in Dairying in the Counties of Ayr, Kirkcudbright, and Dumfries.
- Ella Street, N.D.D., Instructress, Dairy School, Kilmarnock.
- Edith Anderson, N.D.D., Dairymaid, Glenferness, Nairn.
- Margaret Cowan, Dairymaid, Strachur Park, Lochfyneside.
- Jane Barbour, N.D.D., Instructress in Dairying to the East of Scotland Agricultural College.
- Agnes Kinross, N.D.D., Instructress in Dairying to Westmoreland and Cumberland County Councils' School; Instructress in Poultry-keeping, West of Scotland Agricultural College.
- Philippa Wilkinson, N.D.D., Instructress in Dairying, Bedfordshire County Council.
- Agnes S. Morton, N.D.D., External Instructress to West of Scotland Agricultural College.
- Thomas Young, N.D.A., Lecturer on Land Surveying and Book-keeping to the Aspatia Agricultural College.
- John Marchbank, N.D.D., Lecturer on Agriculture, Co. Antrim, Ireland.
- R. G. Harper, Assistant Manager, Lake Copais Co., Greece.
- Jenny Reid, N.D.D., Instructress in Dairying under the County Council of Monmouth.
- John Steven, N.D.D., Russian Agent to Messrs. Clement & Son, Glasgow.
- John G. M'Millan, N.D.D., Cheese Instructor to the Government of Victoria.
- Edward Porter, B.Sc., N.D.A., Secretary of Agriculture, Lancashire County Council.
- James Bradshaw, B.Sc., N.D.A., Lecturer on Agriculture, County Armagh, Ireland.
- John Porter, B.Sc., N.D.A., N.D.D., External Lecturer, East of Scotland Agricultural College.

- G. S. Henderson, N.D.A., N.D.D., P.A.S.I., Deputy Director of Agriculture, Province of Scinde, India.
- N. Munro Kerr, P.A.S.I., Assistant Manager, Aboukir Land Co., Egypt.
- John Hunter, N.D.D., Instructor in Cheesemaking to Ayrshire and Kirkcudbrightshire County Councils.
- J. Stewart J. M'Call, P.A.S.I., Lecturer on Agriculture, Government School of Agriculture, Ghizeh, Egypt; Superintendent of the Agricultural Department, Nyassaland.
- James Anderson, Dairy Manager, Mooi River Creamery, Natal.
- B. Leslie Emslie, P.A.S.I., N. American Representative, The Stassfurt Potash Syndicate.
- G. L. Macfarlane, Assistant, The Stassfurt Potash Syndicate.
- G. M'Gregor, M.A., B.Sc., Science Master, Municipal School, Wigan.
- A. B. Lamont, M.A., B.Sc., Organiser of Agricultural Education, South Africa.
- R. D. Watt, M.A., B.Sc., N.D.A. (Hons.), N.D.D., Carnegie Research Scholar; Assistant Chemist to Transvaal Government.
- Wm. Blair, P.A.S.I., Assistant, Aboukir Land Co., Egypt.
- Alex. Drysdale, Mooi River Creamery, Natal.
- Neil Leitch, B.Sc., N.D.A. (Hons.), County Council Instructor, Meath.
- Jeanie W. A. Speir, N.D.D., Dairymaid, Dunrobin Castle.
- James Wyllie, N.D.A. (Hons.), C.D.A., Lecturer in Agriculture in County of Dublin.
- Allan Carruth, N.D.A., N.D.D., P.A.S.I., Lecturer in Agriculture in County of Monaghan.
- R. S. Forbes, U.D.A. (Abdn.), N.D.D., Lecturer in Agriculture in County of Dorset.
- Wm. D. Clark, Inspector for Mortgage Co., U.S.A.
- John S. Howie, Manager to Livingstonia Mission Estate, British Central Africa.
- William Smith, Dairy Expert in India.
- James MacKenna, M.A., I.C.S., Director of Land Records and Agriculture, Burmah.
- Wm. G. M'Cleary, N.D.D., Manager, Rowallan Creamery, Fenwick.
- John H. Wyllie, N.D.D., Manager, Ayrshire Dairy Co.'s Creamery, Maybole.
- John Anderson, B.Sc., N.D.D., Science Master, Oban High School.
- Thos. Stanier, Duchy of Cornwall Estate Office.
- A. P. Archdale, Inspector, Egypt.
- John Gillies, N.D.A., N.D.D., C.D.A., Lecturer on Agriculture, West of Scotland Agricultural College.
- J. Hunter Smith, B.Sc., N.D.A., N.D.D., Assistant, West of Scotland Agricultural College.

- R. F. Brebner, P.A.S.I., Factor, Gartmore Estate Office.
- E. N. Harvie, P.A.S.I., Grand Trunk Railway Engineering Department, Winnipeg.
- Hilda Newbigging, N.D.D., Dairy Instructress, East of Scotland Agricultural College, Edinburgh.
- John W. Dunlop, N.D.D., Pure Milk Co., Edinburgh.
- William G. R. Paterson, B.Sc., N.D.A. (Hons.), Lecturer on Agriculture, West of Scotland Agricultural College, Glasgow.
- William Stevenson, B.Sc., N.D.A., N.D.D., Instructor in Dairying in the Counties of Ayr, Kirkcudbright, and Dumfries; Lecturer on Dairying and Agriculture, West of Scotland Agricultural College.
- John Brown, B.Sc., N.D.A., Lecturer on Agriculture, West of Scotland Agricultural College.
- James Mackintosh, N.D.A. (Hons.), N.D.D., Agricultural Department, Wye College, Wye.
- Renwick H. Leitch, M.A., B.Sc., N.D.A. (Hons.), Lecturer on Agriculture, West of Scotland Agricultural College, Glasgow.
- Bessie R. Kirkwood, N.D.D., Dairy Instructress, West of Scotland Agricultural College.
- Annie C. Speir, N.D.D., Dairy Instructress, West of Scotland Agricultural College.
- Lily Strang, N.D.D., Dairy Instructress, West of Scotland Agricultural College.
- James Gow, N.D.D., Assistant, Dairy School, Kilmarnock.
- Alex. Y. Allan, Assoc.A.C. (Glas.), Agriculturist to the Church of Scotland Mission Station, British East Africa.
- James Kay, Government Inspector of Woods and Forests, Canada.
- Peter A. M'William, N.D.A., N.D.D., C.D.A., Manager, Denholm Creamery, Hawick.
- Janet M'Naughton, N.D.D., Dairy Instructress, Macdonald Agricultural College, Montreal.
- James Johnston, N.D.A., P.A.S.I., Superintendent, Experiment Station, Kilmarnock.

APPENDIX I.

EXAMINATION PAPERS
FOR THE
COLLEGE ASSOCIATESHIP AND DIPLOMA
IN AGRICULTURE, MARCH, 1908.

SOILS AND MANURES.

(Time allowed, two hours. *Five* questions only to be answered.)

1. How have peaty soils been formed? In what respect does a peaty soil differ from all other soils?
2. Explain clearly why the presence of organic matter in a soil is so important. What soils are apt to be deficient in that substance, and what kinds of manure should be applied to such soils?
3. What is meant by "nitrification?" Give the conditions favourable and unfavourable to this process.
4. What substances are apt to be deficient in most arable soils, and how can the deficiencies be remedied? Explain Liebig's Law of Minimo.
5. What are the forms of combination of phosphoric acid and lime in "basic slag," "bone meal," and "superphosphate?" What form of phosphatic manure would you apply to (1) a soil naturally deficient in lime, (2) a soil rich in lime?
6. What loss is liable to take place when farmyard manure is kept for a considerable time in a heap in the open, and how may this loss be prevented?
7. Give the average percentage of valuable ingredients in the following manures:—Bone meal, sulphate of ammonia, kainit, superphosphate, nitrate of soda, and farmyard manure.

AGRICULTURE.

(Time allowed, three hours. *Six* questions to be answered.)

1. Give in tabular form for the following crops, viz. :—Barley, oats, beans, potatoes, and turnips (*a*) the quantity of seed per acre, (*b*) the time of sowing, (*c*) the time of harvesting, and (*d*) the average yield per acre.
2. What do you consider the best manurial dressing (*a*) with artificials only, (*b*) with farmyard manure and artificials, for each of the following crops:—Turnips, potatoes, cabbages, and mangels? What would be the approximate cost per acre of the dressings recommended if the farmyard manure were valued at 5s. per ton?

3. Estimate in detail the cost of keeping two pairs of horses for a year. What size of arable farm would they be considered sufficient to work assuming a six-course rotation?
4. Give the cost per acre of the following farm operations:—Singling turnips, planting potatoes, cutting hay (*a*) with the scythe, (*b*) with the mowing machine; cutting standing corn with (*a*) the self-binder, (*b*) the manual reaping machine; and threshing corn with the portable steam mill.
5. What bearing has the texture of the soil on the depth and distance apart of the drains? State the causes of stoppage in drains, and the precautions that may be taken to prevent it. Give in detail the cost of draining five acres of medium land with drains 18 feet apart.
6. Explain how a soil may become exhausted in ordinary farming practice. In what ways may this state of exhaustion be obviated?
7. Give a list of the Lowland breeds of sheep, and describe one long-woolled and one short-woolled breed.
8. Group the British breeds of cattle under the following headings:—
 - (1) The milking or dairy breeds.
 - (2) The horned fattening breeds.
 - (3) The polled fattening breeds.
 Give a ration suitable for (1) a dairy cow in full milk, (2) a fattening bullock.
9. What are the main objects of the Agricultural Holdings Acts? Mention items under Division I., II., and III. of the Schedule. Give one scale of rate of exhaustion in common use, and state the original manurial value per ton of decorticated cotton cake, bran, oats, maize, and turnips.

DAIRYING.

(Time allowed, two hours. Not more than *six* questions to be attempted.)

1. What are the more important points to be considered in constructing (1) a byre or cowhouse, (2) a milk room, (3) a cheesemaking room?
2. What are the important ingredients of all food stuffs? Define "albuminoid ratio." How would you calculate the albuminoid ratio of any given food? Give for a cow in full milk (1) the albuminoid ratio in the diet, (2) the quantity of digestible dry matter per day, (3) the actual daily ration.
3. Give approximately the average percentage composition of cows' milk. What constituents are most likely to vary? What is the Government Standard for milk exposed for sale? Explain the usual method of stating any deficiency. Enumerate conditions which influence the quality of milk, and state the effect of each condition you mention.

4. Discuss milk as a medium for bacteria. How can the risk of bacterial contamination of milk be diminished and bacterial growth in milk be controlled?
5. What is the effect of centrifugal force upon milk as exerted in a separator? State and explain the effect on the quality of cream obtained from a separator of (1) enlarging the skim-milk outlet, (2) increasing the speed, (3) increasing the inflow of milk, (4) increasing the temperature of the inflowing milk.
6. Describe how you would treat milk for retailing in towns, and discuss the use of chemical preservatives in this connection.
7. What is meant by "butter ratio?" How many pounds of butter would you expect to obtain from 100 pounds of average milk? Describe the chief qualities of good butter. How can these qualities in butter be most readily obtained?
8. What is the chief aim in cheesemaking? What would be the probable effect in cheddar cheesemaking of each of the following:—(1) neglecting the early cooling of the evening's milk, (2) using an impure home-made starter, (3) using too much pure culture starter, (4) renneting the milk when insufficiently "ripened," (5) renneting over-ripe milk, (6) allowing over-development of acidity before drawing off the whey, (7) adopting too high a temperature of scalding or cooking.

BOOK-KEEPING.

(Time allowed, two hours.)

1. What is the general purpose of opening the various separate accounts in the ledger?
2. Explain the difference between debtor and creditor balances when found on each of the following accounts, viz:—(1) Discount account, (2) bank account, (3) goods account, (4) profit and loss account.
3. A farmer starts with £2,000 in the tenancy of a farm at a rent of £600 per annum, and pays during the first year—one half-year's rent; £150 for rates, taxes, and insurance; £650 for wages; £50 for general expenses in connection with the farm; and £200 for the maintenance of his family. He has laid out in the purchase of seed, £200; horses, carts, and implements, £400; cattle, £200; sheep, £300; and pigs, £70. He has received for corn, hay, &c., sold, £600; for cattle sold, £240; and for pigs sold, £100; and has at the end of the year corn, hay, &c., value £820; cattle, £480; horses, carts, and implements, £360. Debts owing to him for sheep sold, £320; and cash as will appear by the cash account to be prepared. He owes one half-year's rent and wages unpaid amounting to £50.
Prepare his profit and loss account and balance sheet (no other accounts need be shown except the cash account already referred to).

4. Give specimen ruling, with appropriate headings, of the sales book which you would recommend for use by the farmer referred to in Question 3.
5. How should a farmer deal with the following matters in balancing his books :—(1) The value of live stock dying during the year ; (2) outlays on improvements to farm buildings for which he is *not* entitled to compensation at the end of his lease, which has still twelve years to run ; (3) disbursements for drainage work to be repaid at the end of his lease.

6. Show by means of journal entries how the following transactions should be recorded in the books of a farmer :—

| | | | |
|---|------|---|-----|
| Sold corn to A. Thomson and received his cheque in settlement, - | £150 | 0 | 0 |
| Sold sheep to R. Wylie on credit, - | 400 | 0 | 0 |
| Received from him bill at three months for amount due. | | | |
| Discounted R. Wylie's bill with the bank— | | | |
| Received credit for - | 396 | 0 | 0 |
| And being charged with discount, | 4 | 0 | 0 |
| Purchased carts and implements from J. Thomson and granted him a cheque for the purchase price, | 50 | 0 | 0 |
| Purchased cattle from A. Fraser on credit, - | 250 | 0 | 0 |
| Granted him a bill at three months for the amount due, with interest added, £3 5s., | 253 | 5 | 0 |
| Paid wages, - | 75 | 0 | 0 |
| Received cash for eggs and poultry sold, | 20 | 0 | 0 |
| Drew cheque on bank account to retire acceptance to A. Fraser, - | 253 | 5 | 0 |
| Consigned for sale on commission to A. Merchant corn valued and invoiced at | 400 | 0 | 0 |
| Paid in cash the freight on same, | 5 | 0 | 0 |
| Received from A. Merchant account sales which showed that he had sold the corn for - | £500 | 0 | 0 |
| that he had paid charges in connection therewith, - | 5 | 0 | 0 |
| and that his commission was | 20 | 0 | 0 |
| Received cheque from A. Merchant for balance due by him in respect of the consignment of corn, | | | ... |

GENERAL CHEMISTRY (THEORY).—SECTION I.

(Time allowed, two hours. *Five* questions only to be attempted.)

1. If some sulphuretted hydrogen gas was liberated at one end of a room, explain why, in absence of a draft, it would soon be detected in all parts of the room. What is the action of heat and pressure upon gasses? Point out its connection with the formation of wind.

2. What is the average composition of the atmosphere? Explain carefully how you would prove that it is a mixture and not a chemical compound.
 3. How would you prepare ammonia and nitric acid? Give their properties, and show by equation what reaction goes on when the two substances are added together and the compound formed afterwards heated.
 4. In what different conditions does the element carbon exist? Explain its importance in plant and animal life. When burnt in excess of air what compound is produced? State the sources of the same compound in nature and its properties.
 5. What is the chemical composition of blue vitriol, white lead, green vitriol, iron dust, chalk, white arsenic, and corrosive sublimate? Give the preparation and uses of the first two named substances.
 6. What substances are found when wood is heated in a large iron retort? Explain carefully how you would separate the two more important of these in a tolerably pure state.
 7. How would you distinguish between a mineral and a vegetable oil? How are the latter obtained from oil seeds? Is the material left after most of the oil is abstracted of value? If so, why? Explain what is meant by a drying oil, and mention their uses.
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GENERAL CHEMISTRY (PRACTICAL).—SECTION I.

1. Make a qualitative examination of given salt.
 2. Investigate the action of H.Cl. upon (A), (B), (C), and (D).
 3. Identify the given substance.
-

GENERAL CHEMISTRY (THEORY).—SECTION II.

(Time allowed, two hours. *Five* questions only to be answered.)

1. Explain what is meant by the vapour pressure of a liquid. In what direction do salts in solution influence the vapour pressure of such solutions? Take distilled water and brine to illustrate your meaning. Briefly point out the principle of any method you know of for determining the molecular weight of a substance, based upon the above-mentioned property.
2. What is a normal solution of an acid? Explain why it is said that 1 gram of oxide of magnesium is chemically equivalent to 2 grams of caustic soda. How would you prove it?
3. Give the average composition of rain-water collected in the country. Mention the sources of contamination of some spring waters which render them unfit for consumption, and explain why they are unfit. Briefly describe the method you would adopt in testing the purity of a water, and give a short account of the process of purification of waters on a large scale.

4. What is the principal natural source of nitrate of soda? How is the salt obtained in a pure state? Describe any artificial method you know of for manufacturing nitrates. What is the action of (a) strong sulphuric acid, (b) heat upon the salt? Give the properties of the substances formed.
 5. Give the chemical composition and more important properties of silica, bleaching powder, gypsum, red lead, charcoal, and superphosphate of lime. Calculate the weight of sulphuric acid required to convert the phosphate in one ton of mineral phosphate, containing 6.5 per cent. tricalcium phosphate, into superphosphate of lime.
Atom weights: Ca=40, P=31, S=32, H=1, O=16.
 6. What is formalin, chloroform, and urea? Give the preparation and uses of the first two named substances. Show their relationship to methane and formic acid. How would you prepare nitrogen from urea?
 7. Give the chemical composition and properties of cellulose, starch, grape sugar, cane sugar, and stearin. To what class of compound does the latter belong? Point out how you would prepare ethyl alcohol from starch, and stearic acid from stearin.
-

GENERAL CHEMISTRY (PRACTICAL).—SECTION II.

1. Examine qualitatively the given mixture of two salts.
 2. Identify the given substance.
 3. Estimate the strength of the given ammonia solution.
 4. Prepare a sample of chalk from the soil provided.
-

AGRICULTURAL CHEMISTRY (THEORY).

(Time allowed, two hours. *Five* questions only to be answered.)

1. Briefly discuss the question of nitrogen fixation in soils. Under what conditions do the micro-organisms taking part in this process thrive best? Point out what is known of the relative extent to which fixation of nitrogen may go on in farming practice by the above means.
2. Describe the methods in use for the mechanical analysis of soils. What kind of information is gained from the results of such analysis?
3. Write a short account of the manufacture of superphosphate of lime. State what reactions are likely to go on after its application to a soil, and discuss the relative values of the compounds formed as food for plants. Calculate the weight of sulphuric acid required to convert ten tons of mineral phosphate, containing 70 per cent. tricalcium phosphate and 20 per cent. chalk, into superphosphate of lime.

4. What reactions take place when a nitrate is brought into contact with (a) strong sulphuric acid and mercury, (b) strong sulphuric acid and ferrous sulphate, (c) salicylic acid dissolved in strong sulphuric acid? How are these reactions utilised in the estimation of nitrogen?
 5. Discuss the principle upon which the present system of arriving at the manurial value of foods is based. Point out the difficulties met with in practice in making an estimate of the actual manurial values of a given food.
 6. Briefly describe what is meant by albuminoid ratio, heat value of a food, maintenance diet, enzyme action, and available plant food. Give a short account of some recent results obtained upon the question of proteid assimilation by the body.
 7. What nitrogen compounds are present in milk? Distinguish between the action of rennet and of a dilute acid upon milk. Indicate in what way the texture of the curd in milk may possibly be explained by the composition of the medium in which it is precipitated.
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AGRICULTURAL CHEMISTRY (PRACTICAL).

1. Report upon the qualitative composition of the given manure.
 2. Examine the sample of ground lime, and estimate the percentage of quick lime present.
 3. Make a qualitative analysis of given foodstuff.
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JUNIOR BOTANY (THEORY).

(Time allowed, two hours. Six questions only to be answered.)

1. By what characters would you distinguish (a) a monocotyledon, (b) a dicotyledon, (c) a gymnosperm?
2. Name the various kinds of leaves found on a lily plant, and state the function of each kind you name.
3. What are the differences between the underground and air shoots of a potato plant?
4. Name the parts of the gynaecium of an angiosperm. Give an example of (a) a gynaecium with a superior ovary, (b) a gynaecium with an inferior ovary.
5. Describe the fruit and seed of a bean or pea.
6. Describe the construction of a scale from a gymnosperm cone.
7. Describe the microscopic structure of a stoma and explain the function of the pore.
8. Explain how roots obtain materials from the soil and how we find out exactly what materials are absorbed.
9. Give a short account of the life history of a wallflower plant.

JUNIOR BOTANY (PRACTICAL).

1. Describe the flower marked A.
 2. Describe as completely as you can the fruits marked B and C.
 3. Describe the leaf marked D.
 4. State the botanical peculiarity of the specimens marked E, F, and G.
 5. Describe the microscopic specimens marked K and L.
-

AGRICULTURAL BOTANY (THEORY).

(Time allowed, two hours. Six questions only to be answered.)

1. Name and exemplify the various parts of plants that are used as organs for storing food stuffs. Name the chief food stuffs stored in each example you mention.
 2. Name the parts of the leaf of a grass and state the function of each part. What characteristic difference is there between the barley leaf and the oat leaf?
 3. Name the grasses which you would incorporate in a mixture for permanent pasture. Assign reasons for using each component you name.
 4. Give an account of the parasite which causes finger and toe disease in turnips. State and explain the various precautions which might be taken against this disease.
 5. State the characters of the natural order Leguminosae. Name plants belonging to this order which are readily distinguished by their leaves.
 6. State the characters of the natural order Umbelliferae. Name the chief cultivated and poisonous plants of the order. Mention any especial peculiarity connected with the seed of each cultivated plant you name.
 7. What reasons would you assign for thinning turnips? In weeding turnips how would you distinguish young charlock from young turnips?
 8. Name any plant diseases caused by bacteria. Describe the symptoms of one of these diseases.
 9. State Mendel's law, and describe the experiments made by Mendel which led him to this law.
-

AGRICULTURAL BOTANY (PRACTICAL).

1. Name the parts seen on the specimens marked A, B, and C.
2. Describe the leaves marked D, E, F.
3. Describe the flowers marked G, H, I.
4. Describe the fruits marked K, L, M.
5. Identify the fungi marked N, O, P, Q, R.
6. State any peculiarities you notice on the microscopic specimens marked S, T, U.
7. State the botanical composition of the seed mixture supplied.

SURVEYING.

(Time allowed, two hours. Any *six* of the questions to be attempted.)

1. What length of drill 27 inches in width does it take to make up an acre?
 2. What is the gradient or "run" of a drain that has a fall of 1 inch in a chain?
 3. Give the content of a triangular field one side of which measures 1,163 links and the perpendicular therefrom to the angle opposite 854 links.
 4. Give the content of a rectangular plot of ground measuring 580 feet by 360 feet.
 5. A byre measures inside 66 feet long and 23 feet wide; is 9 feet to wallheads, and from that level 9 feet vertical to apex of roof; it is stalled for 44 cows. How many cubic feet of air space is there to each animal, and how many square feet of floor space?
 6. Assuming the figures given in last question are outside measurements, and neglecting door and window openings, what would it cost to whitewash the outer face of the walls at one penny per square yard?
 7. How many cubic yards of hay are there in a circular rick which girths 50 feet at the ground and 60 feet at the eaves, stands 14 feet high to eaves, and from there is 9 feet vertical to top of rick?
 8. Show how the level book is ruled, and make a series of entries therein.
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VETERINARY SCIENCE.

(Time allowed, two hours. *Four* questions only to be answered.)

1. What is swine fever? Describe the symptoms during life and the characteristic *post-mortem* appearances. What are the farmers' duties and responsibilities in connection with this disease?
2. Give the symptoms of worms in the horse. Under what conditions of life do they most often occur? Describe preventative and curative treatment.
3. Describe "foot-and-mouth" disease in cattle, and explain how infection may be conveyed.
4. Describe navel-ill in foals. Give the symptoms and results, and explain what precautions should be taken to prevent the occurrence of the disease.
5. What is the cause of "sheep scab"? Describe the symptoms, and explain the preventative and curative treatment, and the farmers' responsibilities.
6. Describe "braxy," and explain the latest theory of the preventative treatment of this disease.

ZOOLOGY.

(Time allowed, two hours. Six questions to be answered, of which No. 1 is compulsory.)

1. Name the orders to which the insects A, B, and C belong, and give your reasons.
 2. Describe one of the lower forms of animal life.
 3. Name some of the natural enemies of the plant-lice (aphides).
 4. Farmers often speak about "gout" in certain plants, give a brief description of the trouble and the cause.
 5. Name three of the insects which attack cattle, and describe in each case how the cattle are injured.
 6. What is "liver rot"? Give a short description of the trouble and its cause.
 7. The turnip sawfly is to be found near turnip fields. State what you know about it.
 8. Are ground beetles of any service to the farmer?
 9. To what animal is "grub" usually applied? Give a short description of the life history of the animal.
-

AGRICULTURAL ENGINEERING.

(Time allowed, two hours. Six questions only to be attempted.)

1. State and explain the principle of the parallelogram of forces, and deduce therefrom the principle of the triangle of forces.
Two forces of four and eight units respectively act at a point in directions at right angles to one another; determine, graphically, the magnitude and direction of a third force which would be in equilibrium with them.
2. Define stress, strain, Hooke's law, and Young's modulus. Assuming a numerical value for Young's modulus, determine the elongation of a round bar of mild steel, 10 feet in length and 0.5 inch in diameter, when acted upon by a pull of 4,000 lbs.
3. Explain clearly what you understand by the terms "bending moment" and "moment of resistance" as applied to beams. A timber joist, 10 feet long by 9 inches deep by 3 inches broad, is supported at both ends and loaded with a uniformly distributed load of 2,500 lbs. What will be the maximum unital stress in the beam?
4. In a double-acting steam engine the mean pressure is 40 lbs. per square inch, the diameter of the piston 12 inches, and the stroke 16 inches. Determine the horse-power of the engine when making 120 revolutions per minute, and explain, with the aid of sketch, how you would proceed to determine the brake horse-power of the engine.

5. Describe, with the aid of sketches, the construction and setting of a Cornish boiler. If the calorific value of the fuel used were 13,500 and the boiler generated 8 lbs. of steam, estimated from and at 212° Fahrenheit per lb. of fuel, what percentage of the total available energy of the fuel would have been wasted?
6. With respect to the flow of water through pipes, explain the formula $h = f \cdot \frac{v^2}{2g} \cdot 4 \frac{L}{d}$, and state the laws of fluid friction upon which it is founded.
7. Describe the construction of the armature of any dynamo with which you are acquainted, and explain how the current is generated in the armature and how it is rendered continuous in the leads.
8. Describe, with the aid of sketches, the construction and action of a mowing machine.
9. Describe the construction and action of one of the following:—(a) a spring tine cultivator; (b) a hay tedder; (c) a grain drill.

BACTERIOLOGY.

(Time allowed, one hour. *Four* questions only to be answered.)

1. What is meant by the terms "spore," "motility," "obligatory aerobe," "facultative anaerobe," "antitoxin," "saprophyte," "parasite"?
2. Explain fully the action of bacillus acidi lactici in the souring of milk, and the influence of temperature on the process.
3. Give in detail the method you would adopt to estimate (a) the number and (b) the species of bacteria in a sample of milk.
4. What precautions would you adopt to procure milk from the cow as free as possible from bacterial pollution? State how you would prevent the possibility of subsequent bacterial contamination and development during the distribution of the milk.
5. How may tubercular infection be conveyed by milk? State fully the preventive measures you would recommend.
6. Give a classification of soil bacteria in relation to function, and illustrate their importance in respect to plant nutrition.

FORESTRY.

(Time allowed, two hours. *Six* questions only to be answered.)

1. What are the advantages of mixed woods? State the principles which would guide you in selecting the components of a mixture.
2. You are required to plant a damp peaty soil of moderate depth. Describe any preliminary works you might consider necessary and state the species and age of plants you would use.
3. What are the advantages of thinning a wood? What are the effects of over-thinning (a) on soil fertility and (b) on the quality of the timber?

4. A nursery is required on an estate where it is intended to plant 100 acres of conifers (larch and Scotch lime) each year. State your views as to the most suitable size, aspect, elevation, and system of manuring.
5. Define the terms "pit planting," "notching," "natural pruning," "layering," "seedling," and "transplant."
6. The following trees are felled, and the dimensions are :—

| | |
|-----------------------|--------------------------------|
| (a) Length, 25 feet ; | mean circumference, 48 inches. |
| (b) " 23 " " | " 54 " " |

 Estimate the cubical contents by the quarter girth measure, and state the reasons which led to the adoption of this system for the measurement of timber.
7. How would you distinguish between the cones and twigs of the following genera :—(a) *Abies*, (b) *picea*, (c) *larix*, (d) *pinus*.
8. Mention three fungoid diseases attacking forest trees, and describe the appearance of their attacks.
9. Write a short account of the effects of frost on trees and seedlings. What are the worst aspects for "frost tender" species?

GEOLOGY.

(Time allowed, two hours. Six questions only to be answered.

Nos. 1, 4, and 8 must be included.)

1. Describe and give the chemical composition of the following minerals, viz.:—Quartz, apatite, gypsum, mica, and olivine.
2. Explain how a natural soil is formed from the underlying rocks. What kind of soil might result from the decomposition of (1) granite and (2) chalk?
Distinguish between soils formed "in situ" and soils due to the transport of material.
3. Define the terms "fault," "overlap," "outcrop," "spherulitic structure," "syncline," "inverted strata," and "cleavage."
4. Give an account of the geology and physical features of the areas in Britain occupied by one of the following, viz.:—the carboniferous rocks, the silurian rocks, the old red sandstone rocks.
5. What geological conditions favour the existence of (1) natural springs, (2) artesian wells? Illustrate your answer by sketches.
6. What are the chief differences between metamorphic, igneous, and aqueous rocks? Name and describe one rock belonging to each of these classes.
7. What are the principal economic products of the British rocks? State the source of each of the products mentioned.
8. Name and describe the minerals A, B, and the rocks C, D. Identify and place in their proper geological horizons the fossils E and F.

APPENDIX II.

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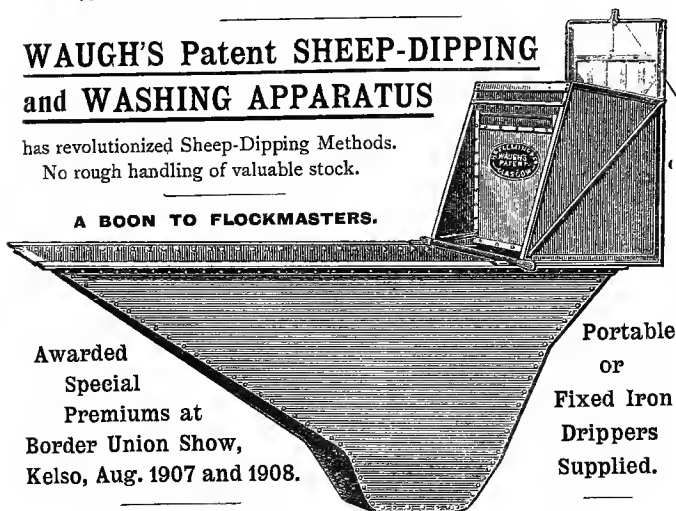
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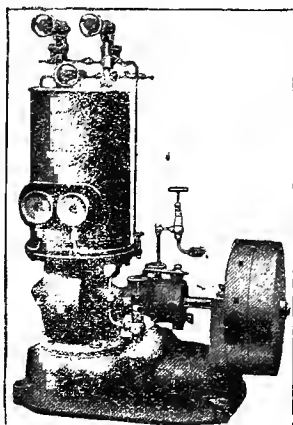
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